

# THE IRON AGE

MAY 25, 1933

ESTABLISHED 1855

Vol. 131, No. 21

## Manufacturing Safety Razor Blades

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**A**LTHOUGH the safety razor with the renewable blade has made the daily shave an easier task, everyone has constantly striven to secure blades that were sharper and gave many satisfactory shaves before discarding. The good blades that were encountered were proof that it was possible to manufacture an excellent product, and the poor ones, perhaps in the same package were evidence that the product was far from uniform and the goal not yet attained.

When it is considered that safety razor blades are manufactured in units of millions, it is not surprising that some variation does exist. Yet to the metallurgist and testing engineer the properties of the two classes of blades are readily determined and the manufacturing causes understood. The manufacturer must constantly seek to overcome this variation by improving his production equipment and methods and by following inspection and testing procedure that will insure the rejection of inferior product and the distribution to the consumer of acceptable and superior blades.

The user's only guide to quality, before actual use, is the purchase price. Unfortunately the selling price is little criterion of the quality of blades, perhaps because many manufacturers adopt the practice of selling identical blades under different brand names at various prices so as to attract all classes of users. The writer has found some of the best blades ever tested or used selling at about three cents each and conversely some of the poorest have been among those selling up to ten cents or more per blade. As a general rule, the cheap blades, such as are sold by street ped-

dlers, are found to be sadly lacking in uniformity. However, with the constantly improving testing and inspection methods the shaving public will surely benefit.

### Types of Blades

There are two general types of safety razor blades in common use; the double edge and the single edge, each of which has particular advantages and disadvantages. The double-edge type is most common, offering, as it does, two shaving edges on each blade. However, the use of the two cutting edges requires the blade to be flexed in its holder. In order that the blades may readily bend and still not break, they are made of relatively thin steel, about 0.006 in. thick, and the tempering operation is carried out at a temperature high enough to overcome brittleness. In addition some manufacturers draw back the center of the blade much higher so that the area of maximum bending is quite soft. Another method of overcoming breakage in flexing is to stamp out the blade from the strip steel so that bending takes place across the grain

rather than with it. Sometimes all three precautions are used by a manufacturer of double-edge blades.

The single-edge blade does not require flexing in the holder and hence can be made of thicker steel. These blades are usually made 0.009 in. thick but in some styles are considerably thicker. Because of the absence of flexing, the steel of the single-edge blades can be left in a much harder state after heat treatment and no differential tempering is necessary. The stiffer steel allows greater precision in the sharpening operations and also holds the cutting edge more rigid while shaving. Many of the single-edge blades are of such simple design that no perforations are required and the steel can be supplied by the mill in the heat-treated condition. The blade manufacturer then has to simply blank out and sharpen.

### Material

**A**LARGE part of the strip steel used in this country for the production of safety razor blades is of Swedish or German origin. One very good reason for this is that comparatively few American specialty strip mills are equipped to roll high-carbon steel to the 0.006 in. thickness required for the double-edged blades. Steel of 0.009 in. is rolled by a larger number of mills in this country and hence a greater percentage of single-edged blades are produced from American steels.

The usual composition of the steel is about 1.20 to 1.35 per cent carbon and chromium less than 0.30 per cent. In the imported steels the chromium content is generally kept at a low figure because of the higher import duty with increased contents of chromium. American steels often contain 0.50 per cent or more of chro-

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**I**NCREASED respect for the safety razor blade while one is using it will be one result of the reading of Dr. Woodward's article. Besides learning the none-too-widely known methods of manufacture, and the conditions that the raw material must satisfy, and also the inspection and testing procedure, the reader will gain some authentic ideas of what happens to a blade in use and how he can help to prolong its useful life.

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mium and the desirable effects of the alloy addition is more pronounced. Special alloy steels are also used by some manufacturers, particularly to secure greater resistance to corrosion and for increased advertising value.

In making the ordinary type of double-edge blade, which is approximately 1¼ in. long by ⅞ in. wide, hard-temper cold-rolled strip steel ⅞ in. wide is used and is supplied in coils. When it is desired to have the grain of the steel run parallel to the short dimension of the blade, strip steel 1¼ in. wide is used or sometimes 3½ in., so as to produce two blades per width. One pound of raw steel will produce about 390 blades, while the finished blades run about 500 per pound.

Single-edge blades are made from narrow strip, the width depending upon the particular design of blade.

#### Inspecting the Material

Inspection of the raw material includes, of course, the usual visual inspection for dimensional tolerances and surface defects. Chemical analysis should be made, not only for carbon and chromium but also for phosphorus and sulphur as an index of the cleanliness of the steel. Hardness is important, as if the strip is too soft it will readily kink and not feed properly in the automatic machinery.

Material as thin as 0.006 in. presents some difficulty in hardness testing. The Vickers tester can be used directly but is not generally available. The usual form of indentation and rebound testers, such as the Brinell, Rockwell, and scleroscope, give erroneous results due to the testing anvil and also will not give satisfactory results in testing a pile or stack of the strip specimen. The writer's preference is to use the Rockwell tester on a stack of about five samples of the strip using a 1/16-in. ball and 60-kg. load. The diameter of the impression is then read on the

metallurgical microscope at a magnification of about 100 diameters and the hardness computed on the Brinell scale. With this method the Brinell hardness numeral should be greater than 200.

A bend test is also useful in detecting dirty steel. Material of the proper hardness should be capable of bending flat upon itself, either direction of the grain, without breaking. Although the steel mills raise objections to this requirement as being too severe, it is the writer's experience that material passing this test will not give subsequent trouble by the blade breaking when flexed in the holder, nor will it require too high a drawing temperature in an attempt to overcome this difficulty.

The structure of the soft steel, when observed on a longitudinal section, should show fully spheroidized cementite with the carbide particles fine and well distributed as shown in Fig. 1. Note should be taken of inclusions or other evidences of irregularities. Fig. 2 shows such an inclusion and streaks in material which is otherwise of very fine structure.

Strip steel of this character lends itself admirably to continuous magnetic testing and is so tested to some extent. When properly carried out, variations in composition, hardness, and the presence of defects can be detected. Magnetic testing can also be carried out on some designs of blades after heat-treatment.

#### Manufacturing Operations

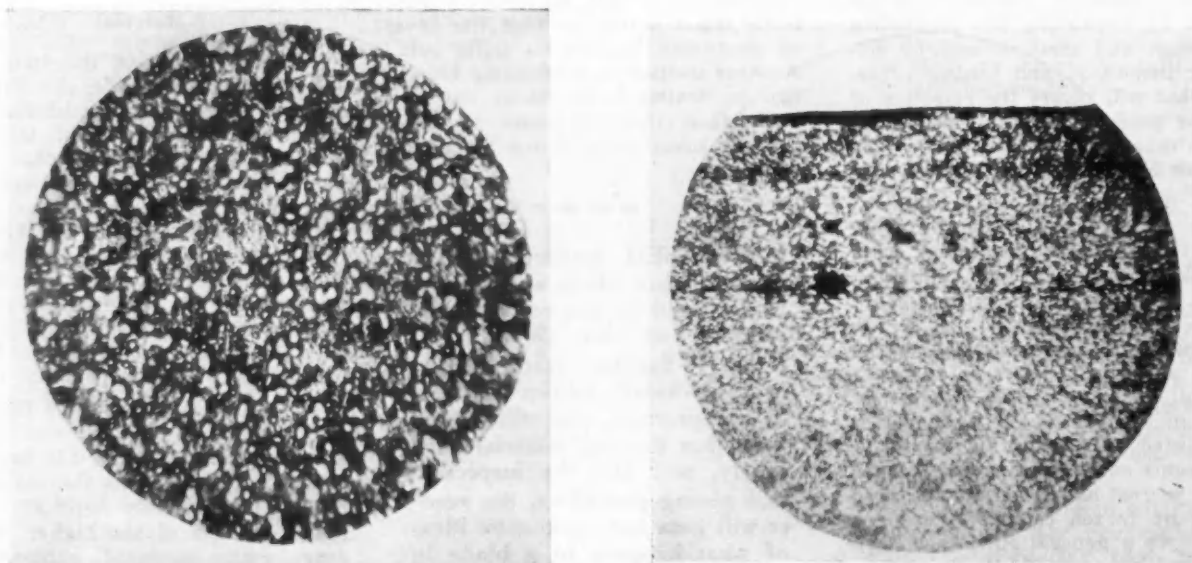
**A**UTOMATIC machinery plays a large part in the production of razor blades and is responsible for the better uniformity now appearing in this product. The tendency is to keep the blades in coiled strip form throughout as much of the manufacture as possible, right up to the packaging machinery in some cases.

Obviously the longer the strip form can be retained, the less individual handling is required and the cost of production correspondingly reduced.

The essential operations are blanking, heat treating, etching, sharpening, inspection, and packaging. Blanking is done by an ordinary "punch and carry" press, making the perforations in the blade and outlining the exterior. A small notch is sometimes left at the junction of consecutive blades to assist in later breaking them apart. The strip passes on to reels of considerably larger diameter than the original coils or may be fed directly to the heat-treating machine. Ends of coils are fastened together by tack welding so that a reel is finally composed of several coils of raw material.

In the past, blades have been punched out separately and heat-treated in batch-type furnaces. The blades were stacked alternately with copper blanks and set up in frames containing a total of about 1000 blades. The entire frame was heated in the furnace, generally a salt bath, and then quenched under jets of water. The blades were then restacked in piles of about 400 without the copper blanks and tempered in oil, using two baths, one for preheating and the other to give the final desired hardness. This method of heat-treating resulted in considerable scaling and discoloration which had to be removed by subsequent operations. There also was considerable variation in hardness and detrimental warping of the blades. Absolute rejections would run as high as 16 per cent and about 30 per cent would have to be salvaged by reworking.

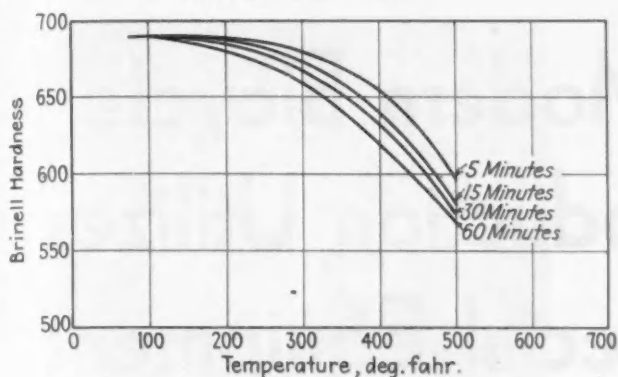
The present practice is to pass the strip through a continuous furnace and quenching device from which it will emerge as bright as it entered and of uniform hardness. The furnace consists essentially of a heating chamber several feet long, heated by



Figs. 1 and 2—Microstructure of soft steel at 1000 magnifications; Fig. 1, of satisfactory structure, and Fig. 2, of one with inclusions and streak.



Fig. 3—Effect of tempering time and temperature on hardness of razor blades. (Below)



gas or electricity, in which is placed a flattened tube of heat-resisting alloy having inside dimensions sufficient to pass the punched strip. The temperature of the furnace is automatically controlled and the burners or heating elements so arranged that the last half of the tube is at a uniform temperature throughout its length. At the entering end of the tube a small gas flame prevents entrance of air. At the exit end the tube connects directly to two water-cooled quenching blocks, held apart the thickness of the strip. By this means the strip is effectively quenched and kept flat and bright in the operation. In some plants the quenching blocks are designed to give the center of the strip much less quenching, or a small gas flame is later played on the center so as to produce the soft center previously mentioned.

From here the strip passes directly between hot tempering blocks where a short time draw at a relatively high temperature is accomplished. It is desirable to give such a draw at this point or otherwise the strip would be too brittle for satisfactory reeling. For best results this draw should be followed by one of a longer duration of time at a lower temperature in order to secure greater uniformity of hardness. The second draw is carried out in either a convection type air furnace or in an oil bath. The drawing operation cannot be carried out with the strip coiled but must be done either with the strip straight as in the short time operation or after the blanks are broken apart. Otherwise the blanks would take a permanent set with a curvature.

Fig. 3 and 4 show, for typical blade material, the effect of time and temperature upon the hardness and bend test. (The bend test will be described in the second part of this article.) These curves illustrate how similar properties can be obtained at a low temperature for a long time or at a higher temperature for a short period. As in most tempering operations, the longer drawing times at low temperatures give superior cutting qualities in the finished blades.

From the quick tempering operation the strip passes to reels, to the etching machines, or is broken up into

separate blanks. The etching of the names and trade marks is carried out by means of revolving rubber stamps moistened with etching acid, followed by an alkaline stop-bath, a rinse, and a drying operation. Application of clear lacquer or colored lacquer can also be made at this point.

#### Grinding, Honing and Stropping

The sharpening operation is carried out in three steps: grinding, honing and stropping. With improved grinding and stropping, the honing is sometimes omitted.

These operations may be performed either in the continuous strip, with the blanks loaded in holders carrying several blades; or by feeding blanks between continuous belt type holders. Several grinding wheels are staggered on each side of the moving chain of blanks and alternately grind one side of each of the cutting edges. The wheels are of fine grain and wide faces so as not to readily wear down. Depending upon the type of wheels and equipment, the grinding may be done either wet or dry. The first wheels in contact with the blades remove the majority of the stock while the last one removes only a small amount of metal to bring the blade accurately to size. The wheels are so set that the included angle of the cutting edge is from 8 to 18 deg., depending upon the style of the blade. The majority of the double-edge blades have an angle of approximately 15 deg., whereas the single edge ones may go as low as 8 deg., because of the stiffer backing.

Throughout the grinding operation constant inspection must be made for dimensional accuracy as the final size is practically determined at this stage. Means are also provided for preventing the grinding dust passing on to subsequent operations.

The honing machines may be an extension of the grinding equipment or a separate unit. The blades pass between revolving canvas covered blocks, impregnated with a lapping compound, which give an intermittent stroking to each side of the blade. The setting of the hones, in relation to the blade, is such that the hone applies a slight pressure to the tip

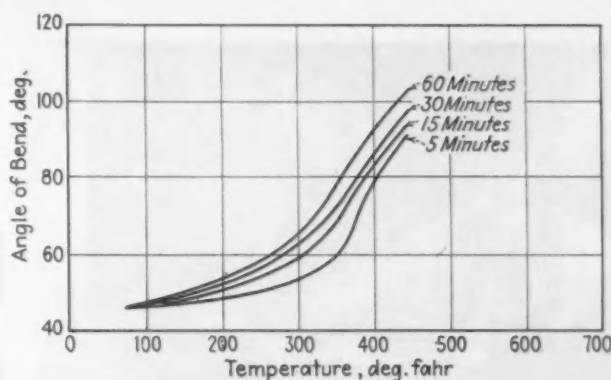


Fig. 4—Effect of tempering time and temperature on bend test of razor blades. (Above)

of the cutting edge, slightly flexing it and honing only the tip of the cutting edge. The stropping equipment is similar to the honing except that leather faces and a rouge compound are used.

#### Inspection

**R**OUTINE inspection methods vary with different manufacturers and depend to some extent upon whether the blades are still in a continuous strip or individual. When continuous, inspection for nicks and imperfections in the cutting edge can be made by passing a magnified image of the edge into a photo-electric cell system. Imperfections passing this system cause electrical controls to reject the poor blades as they are broken from the strip.

If the blades have previously been broken from the strip, nicks can be located by tightly stacking together in a frame a hundred or more blades. When viewed under proper illumination, the imperfections stand out very prominently and the poor blades can be picked out.

In many places the simple operation of cutting a hair held in the hand is used for testing sharpness, upon a small percentage of the production. This test is obviously so dependent upon the personal equation that it is being replaced in up-to-date factories by more scientific methods, such as those described later.

*A second and concluding part of this article is devoted to tests of the razor blade before and after service.*

Some indication of the steel requirements of breweries is indicated by ten orders for brewery tankage which were recently received by Freyn Engineering Co., Chicago. These orders included 191 tanks totaling 30,000-bbl. capacity and requiring the placing of orders for over 750 tons of iron and steel. The orders included cookers, fermenters, pressure storage tanks, Government tanks, settling tanks, hot wort tanks and reinforcements for cellars. Most of the steel was in the form of plate, although some structural and concrete reinforcing bar as well as castings were included.



After filing, the complete frame is trued up on a steel table equipped with jigs and truing devices.

# Modern Bicycle Production Utilizes Special Equipment

**T**HIS article presents some of the present-day features in the manufacture of bicycles at the plant of Iver Johnson's Arms & Cycle Works, Fitchburg, Mass. This company, founded in 1871 by Iver Johnson, started making bicycles of the so-called safety design in the late 80's and, without change of management or name, has been in continuous production of bicycles ever since.

Many of the tools used at this plant were designed and built by the company's engineers and nearly all production operations are the result of years of development.

**M**ASS production methods in industry developed concurrently with the evolution of the machine tool. Each was dependent upon the other. In the bicycle industry the need for automatic and semi-automatic tools came years before such equipment was generally available, and so the early bicycle manufacturers were forced to design and build much of their own production machinery. The Iver Johnson company was one of these and its early success was due in large part to its ingenuity in tool design. Among the many ex-

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By HERBERT R. SIMONDS

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amples of unique production equipment to be found in the plant is a bank of automatic screw machines built in the shop some 30 years ago and still operating efficiently.

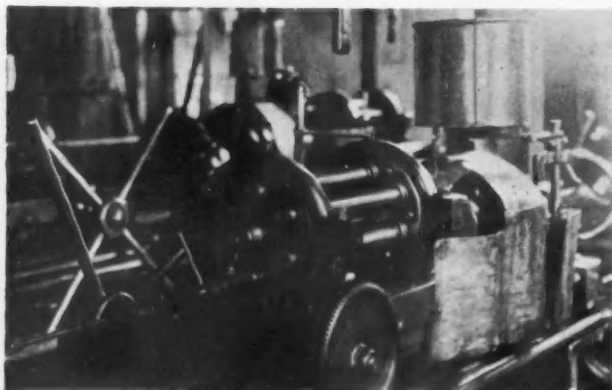
In addition to designing equipment, it was necessary for the manufacturer of 30 or 40 years ago to pay marked attention to the kind and quality of

materials received, and this same care in selection and inspection has carried over to present-day practice.

A modern bicycle consists essentially of a frame made of steel tubing, forgings such as crank and axle, fork crowns, handlebar stems, and accessories. While the Iver Johnson company uses chrome-molybdenum tubing for its racing models, all other models are built from seamless drawn carbon steel tubing with the carbon running from 0.20 to 0.30 per cent. The cranks are made of chrome-molybdenum forging steel, quenched from 1550

▲ ▲ The right crank and axle is threaded and machined in one set-up on a specially designed turret lathe.

▲ ▲ This home-designed automatic screw machine was built about 25 years ago and is still in successful operation.







The frame members are joined by dipping in a tank of molten brass.



Sprockets are polished by hand on leather-surfaced wheels coated with a mixture of emery and oil.

deg. F. and drawn at 700 deg. F. For standard designs the main part of the frame is made of 1-in. tubing with 19-gage walls. The joints in this frame are made in several ways. One of the commonest is to slip two parts to be joined over cylindrical arms of a forging, and then braze the complete assembly.

#### Forgings Used for Joints

A straight joint is sometimes made by using a piece of heavy-weight tubing or a stamping in place of the forging, but in general forgings are used for strength and safety. Experience has developed many wrinkles in the brazing process. One of these is to drill the forgings to facilitate the flow of brass. Another is accurately to control the temperature of the brass at the time of making the joint at close to 1900 deg. F. The joints in the frame are drilled and pinned before the brazing to form a further safeguard and to facilitate handling.

The Iver Johnson plant, having developed gradually through a period of 40 years of manufacturing, is a combination of new equipment, ingenious homemade jig attachments, and special machine tools. Elaborate revolving jigs have been designed for machining forgings. In one of these the front fork crown forging is machined on a profiler built at the plant. The forging comprising the right crank and axle is threaded and machined in one set-up on a unique machine tool somewhat similar to a turret lathe. The turret has six positions which perform the following operations: milling for nut, milling for taper, milling and threading for adjusting cone, milling and threading

for stationary cone, milling shoulder for sprocket.

#### Hand Methods Survive for Bending

Many of the operations at the plant are of the craftsman type as compared with high-pressure machine methods. Nevertheless the soundness of such operations is demonstrated by the economy and speed of production possible under present conditions. An example of the hand method is seen in the forming of the front fork sides. These are bent cold around a steel form by the use of long-handled bending rods. Some handlebars also are formed this way, although many are bent hot in presses.

The hand operation is not always as simple as it sounds, and back of the easy appearing cold bending of handlebars, a long period of testing and experimenting has been necessary to develop the right quality of tubing and the correct design of steel forms.

#### Sprockets Made From Stampings

In contrast with the hand operation is a bank of automatic cut-off saws which supply tubing in desired lengths for various frame parts. Each circular saw is 5 in. in diameter and revolves at 70 r.p.m., making 200 cuts an hour. The sprockets are stampings bought as blanks and afterward trimmed and reamed. The general outline of the teeth is formed in the original stamping but is trued up by machining with a proper dial control. The completed sprockets are afterward polished and plated.

A great number of miscellaneous small jobs are called for in the complete assembly of a bicycle. These in-

clude slotting frame for seat post, threading for the chain adjusting screws, threading mud guard fasteners, and riveting and forming mud guard braces. Some 25 or 30 parts are made on automatic screw machines from solid bars. They include cones, cups, nuts, screws, pins and caps.

Operators after long experience have become expert at assembling and brazing the frame. After the rough assembling, the joints are brazed by dipping the frames in molten brass baths. The operators become very skillful at this and are able to cause the brass to flow where it is required without wasting metal on other parts. After brazing and before enameling, excess brass is stripped off in an electric cleaning process, after which the frames are filed and polished in the filing room.

After filing, the complete frame assembly is inspected and trued up on a steel table equipped with jigs and truing devices. This operation is necessary to make the frames all uniform and interchangeable. It is essentially a hand operation helped out by mechanical devices.

#### Enameling Calls for Close Attention

Enameling is a fussy job calling for close attention to many details. After the frames are carefully cleaned and inspected they are enameled by dipping in enamel tanks. Plugs are placed in the openings during the painting operations, in order to prevent the enamels from being wasted by entering the insides of the tubes. Four or five coats are applied, depending on the type of enamel used. (Concluded on Advertising Page 14)

# Appraisal of Industrial Gas Fuels

By A. E. BLAKE

**T**HE replacement of various fuels with one or another variety of industrial gas is becoming a matter of increasing interest. This is partly due to the necessity for reduced costs and improved output, and partly to the activities of various interests advocating the use of gas fuel. Included among the latter are the gas utilities, usually with men carefully trained in the sale of industrial gas to the extent of omitting the mention of no small advantage, whatever, in seeking to justify the cost. Mention is also due of the intensive sales activities of interests seeking to enlarge the market for "liquefied petroleum gases," such as propane, butane, pentane, and their mixtures.

Certain branches of the coal industry have awakened to the fact that substantial tonnages can be marketed at a uniform year-round rate, to industrial plants requiring cheap but clean gas, cold and dry, suited to the usual requirements, from the standpoint of distribution, quality and economy.

Much literature is being issued relative to these sources of industrial gas, but little that is substantial in the sight of those who must apply cold facts and figures to the individual situation, and become responsible for recommending or rejecting the adoption of a fuel—chemical, metallurgical, ceramic and mechanical engineers.

The gas industry has done much to fit its representatives to overcome technical sales resistance. Among numerous items, a comprehensive compilation of helpful data has been prepared and kept up to date by an appropriate committee of industrial gas engineers under the auspices of the American Gas Association. The third edition of the book, "Combustion," was released recently.

It is the purpose of this article to furnish a certain amount of supplementary information for technical men, to assist them in making more accurate cost comparisons, and to discuss very briefly other vital considerations. This information is prepared with the use of basic data contained in "Combustion," to serve best the many who regard it as the standard work of its type.

A limited number of gases has been chosen for use as examples covering the existing range of possible selection. These few represent groups in some cases, falling in one or another class because of composition and properties, sources or cost. These gases are described in Table I. They

have been arranged in order of their theoretical combustion or "flame" temperatures.

**Blue Gas**, or "straight," or "uncarbureted," water gas is generally made with coke and steam. The use of certain bituminous coals has also been reduced to standard practice. Anthracite has been used for many years, also.

The differences in analysis of gas from any of the three solid fuels are unimportant. When soft coal is used, the hydrogen content is usually higher. Blue gas is often used when exceedingly hot, sharp flames are required, as in electric lamp glass work, and for heavy steel horne, roller, or hammer welding.

**Water Gas** is the technical name for what is commonly called carbureted water gas. The sample was chosen because of its high quality, meaning in this case, a small percentage of inert gases.

The raw materials for water gas are coke, soft coal, or anthracite; steam, and what may be loosely called "gas oil." This last item may be, for economic reasons, any petroleum product, such as heavy Mexican crude, high grade solar oil, or even casing head gasoline. Topped paraffin base crudes have been generally used when normal conditions held, and freight

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**G**REAT differences in quality of industrial fuel gases may have little practical meaning when it comes to their actual use. The selection of a gaseous fuel is susceptible to a mathematical determination, and this the author has attempted to show in an unusual study of the physical and chemical data available.

Mr. Blake has had some fifteen years intensive experience in the gas field, at one time with the Surface Combustion Co., later with the United Gas Improvement Co., and more recently in the development and distribution of natural gas. His observations have included ten months' use of natural gas in a steel plant for melting and mill furnace heating applications.

rates inland, or the small size of equipment, shut out imported oil.

It is hardly conceivable that water gas would be utilized as industrial fuel except as retailed to a consumer by a public utility. The thermal efficiency in making it is relatively low. The cost of apparatus is high, and material costs are constantly varying. Labor and up-keep costs would be prohibitive, outside of a utility organization, for moderate industrial demands.

**Commercial Butane** is generally a mixture of normal and isobutane, plus small amounts of dissolved ethane, propane, and pentane. In combustion, these related paraffin hydrocarbons, with the butane, give approximately the results had with the pure material, which is named for convenience.

Butane, and the paraffin homologs mentioned, are chiefly by-products of the petroleum industry, particularly in regions producing both oil and natural gas. So-called wet natural gas forms the chief source of supply.

Properly considered, these liquefied petroleum gases are raw materials for industrial gas making, since they are transported and sold as liquid, but by far the best utilized when diluted with air, in a ratio approximately one volume of gas to five of air.

**Oven Gas** can be taken to represent a group, including gas from by-product coke ovens and coal gas from various types of intermittent and continuous coal carbonizing retorts and ovens, either vertical, horizontal, or inclined. With the exception of steel plants, aluminum plants, smelters, etc. which require metallurgical coke, it would be rare to find oven gas used industrially, except when retailed by public utilities.

**Natural Gas** is the product of earth drilling in regions underlaid with geological formations impregnated with gas. Gas well depths vary from a few hundred to over 10,000 ft. Natural gas has been found to include nearly all extremes in the variations in composition noted, from practically pure methane, ethane, or propane, to inerts, such as pure nitrogen and carbon dioxide. Gas from the Eastern fields generally contains less than 2 per cent of non-combustibles. Mid-continent gas may contain 10 per cent to 15 per cent of inerts. Kansas has produced much gas too high in nitrogen to burn.

Outside the producing regions, marketing is accomplished through utilities, with a few exceptional cases of

industrial pipe line concerns selling customers direct. Delivery of natural gas by wholesale pipe-line concerns is being slowly extended over Eastern territory where marketing prospects warrant it. Here, the natural gas commonly reaches the consumer mixed with manufactured gas from the plant of a local utility.

Should supplies be adequate when securities representing manufactured gas facilities are retired, we may expect distribution of pure natural gas. Later, when depletion sets in, large-scale gas manufacture for wholesale distribution over a then huge network of pipe-lines is talked of. Many of these lines do, or will, pass through or near coal regions.

The five representative gases already discussed are sometimes referred to as high-duty gases, because they can be used to maintain very high temperatures with fair economy, without recourse to any preheat of air for combustion.

Another group, represented by the three remaining in Table I, comprises what are commonly called producer gases. These, in contrast to the high-duty gases, do not yield extremely high temperatures, unless either the air, or the gas, or both, are preheated. Since the common industrial uses of gas seldom require temperatures which cannot be economically had with producer gas, this distinction between the two groups is of small importance. On the other hand, considerations of cost and control (physical and chemical) of furnace production, make these gases worthy of searching study.

**Anthracite Gas, Anthracite Producer Gas, or Semi-Water Gas**, long used on a small scale for power purposes, before displacement of gas engines by the Diesel type, has maintained itself in a small way for furnace use until the last few years, when it has forged ahead and is rapidly gaining in favor for very diverse industrial uses. This has been due to the development of highly efficient and convenient equipment, and the frequent realization that installation costs can be quickly recovered in savings in cost of heat, and by improved, or increased, output.

The cheapest grades of anthracite are standard material for gas making. Air and water are the other requisites. The process is one of continuous blasting of a generator (producer) with air saturated to the proper degree with wet steam. The heat of formation of carbon monoxide is utilized, in situ, to promote the decomposition of steam by hot carbon, with liberation of CO and H<sub>2</sub> to increase calorific value of the output, prevent great loss of sensible heat, and reduce the amount of gas cooling water required. Heat loss is further reduced by a complete water jacket around the shell of the producer. In this jacket the water required for saturation of the blast is heated. The use of water vapor in maintaining low tempera-

ture in the active zone prevents ash fusion, or clinker formation, and automatic means are used for ash removal. Such adequate auxiliaries and instrumentation are provided that enormous quantities of heat in the potential form of clean, dry gas can be supplied with part time use of a single employee. Gas is made as

needed, and storage facilities are unnecessary. Space requirements are small. Use of Anthracite removes the problem of tar disposal.

**Bituminous Producer Gas** is generally made with high volatile coal. The other materials are steam and air. Plant steam is commonly used, since it supplies motive power

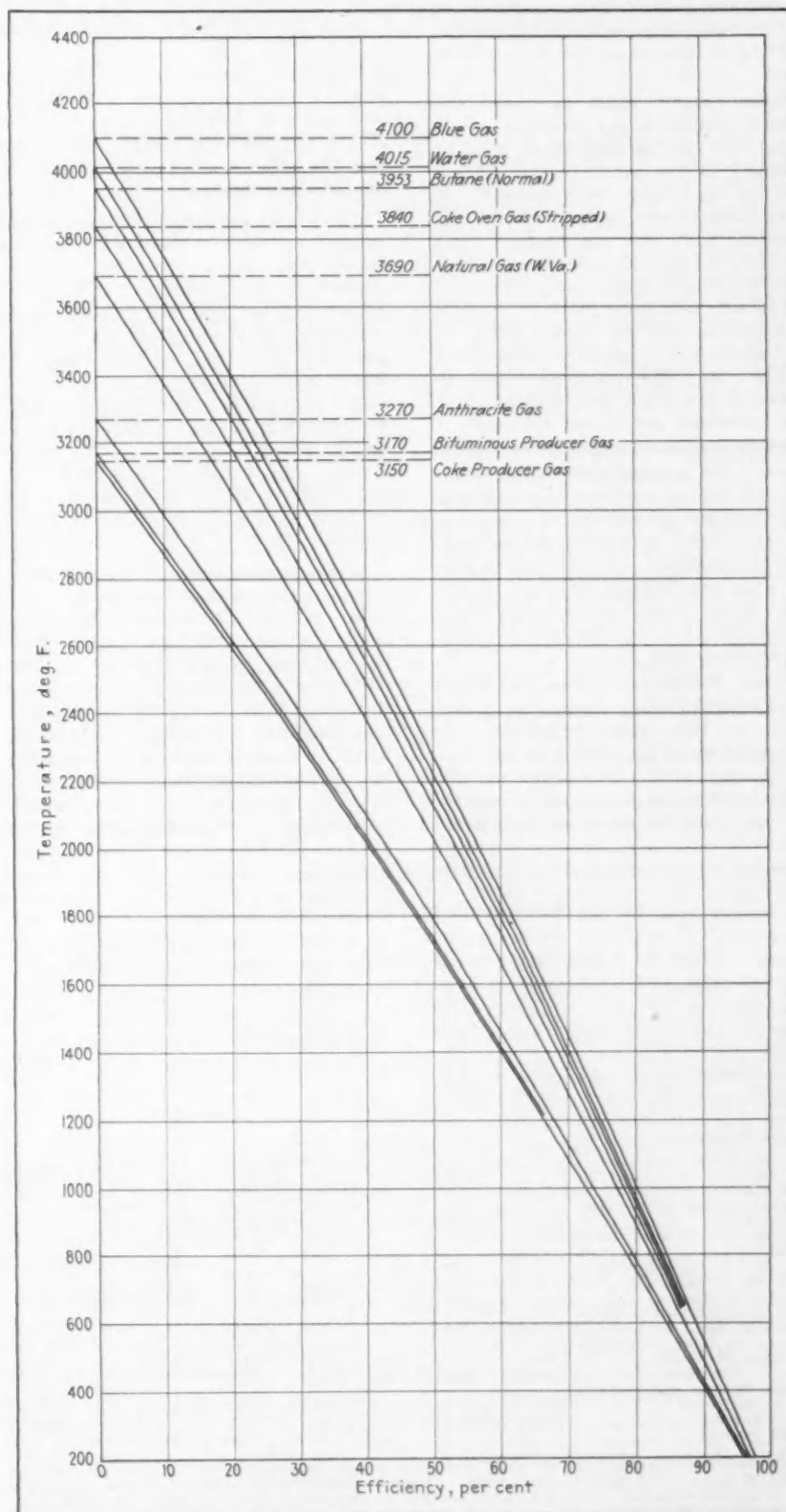


Fig. 1—Thermal efficiency curves of representative industrial gases. For the data reference is made to "Combustion," third edition, of the American Gas Association, Industrial Gas Series, 1932.



for blasting, whether by injection, or through a turbo blower, and at the same time, serves as the source of moisture for enrichment of the gas. The cleaning of bituminous producer gas is not a simple matter. It is not merely a question of dust removal. Coal distillation products ranging from soot, to heavy and light tars and oils, and to more or less fixed gases, must be dealt with. Too little cleaning permits fouling of the distribution system and burners. Too thorough cleaning results in gas of low calorific value.

When certain coals are used and control conditions are properly established, the tar, or part of it, may be returned to the producer for decomposition and gas enrichment. No other satisfactory method of disposal seems to have been discovered. Such tar does not fall within the specifications for any commercial product. It is variable and very difficult to burn. It cannot be sold or thrown away. It may carry 5 to 8 per cent of the heat of the coal. For good producer efficiency, only high grade lump coal, at a premium price, can be used.

Bituminous producer gas is seldom cleaned for general industrial heating. Its field of usefulness is in large-scale heating operations, in the raw, hot condition, in which its sensible heat is available and the tar vapors and soot are utilized as part of the fuel. Steel, glass, and cement making are the chief applications for raw, hot producer gas.

Coke Producer Gas is made in practically the same way, and often in the same apparatus as anthracite gas. Nut and pea coke are the favored sizes, since good results are had and these grades are cheapest. The chief use for such gas, at pres-

ent, is for replacement of oven gas, or coal gas, in the heating of coke ovens, coal gas retorts, etc. By changing at will from one gas to the other, the potential send out of oven gas is 100 per cent of that produced by the coal, and the minimum is 60 to 65 per cent of it. The coke used is unsuited for blast furnace fuel, and not equal to the standards set for domestic coke.

#### Common Properties of the Gases

Common properties of gases in Table I have been stated with the intention of enabling one to make most of the comparisons needful for judging the effects of a substitution of one gas for another.

Gross and net British thermal unit values are the universally accepted standards for expressing calorific power, in this country. Differences between gross and net values represent what is often called the "hydrogen loss" of a fuel. It represents the latent heat at 60 deg. F. of the water vapor derived from the hydrogen content of the gas. Gas is generally sold on the gross B.t.u. basis. This leaves a public utility free to vary the hydrogen content of its send out at will, as long as the gross value is maintained.

In the utilization of gas, one main factor is the yield of heat made available, meaning the energy which does not accompany the combustion products as they leave the furnace. This varies with the temperature at which it is necessary to reject the combustion products. Heating processes in which the latent heat of the moisture in combustion products is recovered, even in part, are very rare. Slight advantage in economy may result

from a change in composition of city gas, and where there is any choice in supply, the net heat value should be taken for comparison, in conjunction with price. When a substitution for city gas is being considered, it is of greatest importance to use net values. Ratio of net to gross B.t.u. shows that a "lean" fuel, like coke producer gas, applied to low temperature work, like drying or baking, will actually be worth more, B.t.u. for B.t.u. gross, than oven (coal) gas, in spite of the seemingly disadvantageous gross values of 137.2 and 510.6 respectively.

**Theoretical Combustion (or Flame) Temperature** is often cited as a basis for comparison of gases. In reality, it is of small practical importance. By definition, it is that temperature at which theoretical efficiency is zero; or it would be the temperature of combustion products from use of quantitative air, if all energy liberated in combustion were to apply itself toward heating those gases. This is in disregard of radiant energy losses, and heat of dissociation of water vapor and carbon dioxide. Lately, these heats of dissociation have been taken into account, possibly for the sake of exactness and thoroughness. In view of the fact that theoretical combustion temperature is useful only to indicate the relative position of a gas as to the efficiency with which it can be utilized, without being applicable to a computation involving the actual cost of useful heat for any particular operation or industry, it seems hardly worth while to take account of dissociation. Otherwise, the radiation losses should be applied as further correction.

Dissociation becomes measurable at about 2800 deg. F. where it does not usually exceed 1 per cent, and the vast majority of applications for cold, clean industrial gas call for temperatures which do not come within 1000 deg. of that temperature.

#### Evaluation:

For a plant engineer, there is available a certain form of "dead reckoning" by which comparative values of fuels can be made plainly evident. Two factors are involved. One is the utilization efficiency, or available heat of a fuel, which may be plotted graphically, with use of very accurate data, to show the percentage of available heat at various temperatures throughout the range, from 60 deg. to theoretical combustion temperature; and conversely, the percentage of heat lost in flue gases. Such curves have been plotted for the gases of Table I, and will be found in Fig. 1. The second factor is that of cost of fuel required for the heating operation, including the expense of burning.

From inspection of Fig. 1, it can be seen that a 1600-deg. heating operation (furnace temperature) can be conducted with anthracite gas with a theoretical thermal efficiency of 56 per cent, and with natural gas, at 62

(Concluded on Advertising Page 14)

TABLE I—COMPARISON OF VARIOUS TYPICAL GASES<sup>2</sup>

Analysis	Producer Gas—							
	Blue	Water	N-Butane	Oven	Natural	Anthracite	Bituminous	Coke
Carbon Monoxide (CO) .....	43.5	34.0	....	7.0	....	27.1	25.3	30.96
Hydrogen (H <sub>2</sub> ) .....	47.3	40.5	....	55.4	....	16.6	9.2	9.30
Methane (CH <sub>4</sub> ) .....	0.7	10.2	....	26.1	84.0	0.8	3.1	0.70
Ethane (C <sub>2</sub> H <sub>6</sub> ) .....	....	....	....	2.5	15.8	....	....	....
Ethylene (C <sub>2</sub> H <sub>4</sub> ) .....	....	6.1	....	....	....	0.1	0.8	....
Benzol (C <sub>6</sub> H <sub>6</sub> ) .....	....	2.8	....	....	....	....	....	....
Carbon Dioxide (CO <sub>2</sub> ) .....	3.5	8.0	....	2.0	0.2	5.0	3.4	3.56
Nitrogen (N <sub>2</sub> ) .....	4.4	2.9	....	7.0	....	50.0	58.2	55.43
Oxygen (O <sub>2</sub> ) .....	0.6	0.5	....	....	....	0.4	....	0.05
Butane (C <sub>4</sub> H <sub>10</sub> ) .....	....	....	100.0	....	....	....	....	....
<b>Common Properties:</b>								
B.t.u. (a) Gross .....	301.0	550.0	3,353.0	510.6	1,133.7	151.1	155.9	137.2
(b) Net .....	277.3	508.0	3,102.0	456.4	1,025.3	142.2	147.5	132.0
Ratio of net to gross B.t.u. ....	.921	.924	.925	.894	.904	.941	.946	.962
Theoretical combustion temp. <sup>1</sup> deg. F. ....	4,100.0	4,015.0	3,953.0	3,840.0	3,690.0	3,280.0	3,170.0	3,150.0
Quantitative air-gas ratio (Gas=1) .....	2.21	4.60	31.1	4.41	10.68	1.12	1.24	1.03
B.t.u. per cu. ft. quantitative mix. (a) Gross .....	93.7	98.1	104.5	94.3	97.1	71.4	69.7	67.6
(b) Net .....	86.4	90.6	96.6	84.4	87.8	67.7	66.0	64.4
Cu. ft. of combustion products per cu. ft. gas .....	2.76	5.29	33.6	5.11	11.96	1.90	2.07	1.85
B.t.u. per cu. ft. of combustion products (a) Gross .....	109.2	104.0	99.8	99.9	94.9	79.6	75.5	77.8
(b) Net .....	100.9	96.2	92.3	89.2	85.7	74.9	71.4	74.8
Cu. ft. of gas per million B.t.u. (a) Gross .....	3,320.0	1,818.0	298.0	1,958.0	880.0	6,610.0	6,315.0	7,270.0
(b) Net .....	3,601.0	1,969.0	322.0	2,185.0	975.0	7,025.0	6,780.0	7,565.0
Specific gravity .....	0.56	0.63	2.07	0.38	0.63	0.86	0.89	0.90

<sup>1</sup> No correction for dissociation. Such correction means little and rarely, if ever, changes the position of gases in any table of comparison. Thermal efficiency and cost are far more important to an industrial consumer, after the fact is established that certain kinds of gases are satisfactory from standpoint of production rate and quality of production.

<sup>2</sup> Examples of gases have been chosen to avoid "illuminants" on account of the ambiguity of that term.

# Drop Forging Industry's Overcapacity Calls for Constructive Reorganization

By JACOB B. SEHL

Secretary and Cost Agent, American Drop Forging Institute

THE drop forging industry has an appalling overcapacity, considering any possible demand that might be placed upon it. The United States Department of Commerce has just made a survey of the investment, production, and capacity existing in the drop forging industry. The results of this survey were published and distributed last September, in a book entitled *Production and Capacity in the Drop Forging Industry*. In the second paragraph of the "Foreword" of this report, is the following statement: "The findings of the study are contained in this report, and they clearly indicate that the single-shift capacity substantially exceeds actual tonnage output. For the period covered by the survey, 1925 to 1931, the tonnage production in 1929 was materially greater than in any other year; however, in order for production to approximate factory capacity in 1931, it would be necessary for the output to increase more than 60 per cent above the 1929 level. This single fact emphasizes the need, and can serve as a basis, for constructive economic planning by the industry."

Therefore, if the industry is to discharge its duty to its bankers, its stockholders, its employees, and its customers, it must immediately give the problem the attention it demands. Like every other industry, we blame the situation on present economic conditions. We close our eyes to the fact that a great improvement in economic conditions, although it would undeniably improve the conditions in the drop forge industry, would not, to any great extent, effect a permanent cure.

## Reorganization is Necessary

Combinations or mergers must be effected which actually, not theoretically, scrap equipment and unrequired executive talent. It is a disagreeable prescription, but if the patient is to survive it must be taken and taken in goodly doses.

It is needless to say that the remarks in the foregoing paragraphs are directed to the so-called commercial drop forge shops. Actually, drop forge equipment is installed in three quite different types of shops, considering the source of orders for their product. The first type of shop, which is commonly known in the trade as the departmental shop, we shall call Group "A." This group is not primarily competitively in the drop forge industry, but nevertheless carries a

heavy investment in drop forge equipment. This equipment is used to produce forgings which are subsequently machined and assembled into the main output of the corporation. Its two chief exponents are the automobile and agricultural implement manufacturers. We should also place in this group certain manufacturers of railroad cars and fire arms. Fortunately for the commercial shops, the shops in Group "A" rarely seek outside work for their forging equipment, being content to use these shops for their own forgings only.

The second type of shop, the so-called parts shop, we will call Group "B." The plants in this group produce forgings which they machine and place in parts assemblies, usually subsequently sold to motor car companies. In this class are companies producing automobile and tractor motors, automobile transmissions, automobile axles, universal joints, and brake assemblies. In this group we would also classify the manufacturers of articles placed in tool kits, such as wrenches, pliers, screw drivers, and the like.

Some of the shops in Group "B" are semi-commercial in manufacturing and sales policies; that is to say, a part of their production capacity is regularly devoted to the manufacture

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GOVERNMENT survey shows that the drop forging output of 1928 and 1929 averaged less than 57 per cent of the industry's capacity.

Faced with such an overwhelming excess of productive capacity, it is evident that drastic steps must be taken by members of the industry if it is to hope for stabilization.

In this article, the author suggests a plan of consolidation and reduction of capacity which will be of interest not only to the specific industry to which it refers, but to others suffering from similar capacity elephantiasis.

of forgings in accordance with customers' blue prints. Unfortunately, the balance of this group, unlike the shops in Group "A," frequently—more particularly in times of depression—quote on forgings for other companies. Their competition is most vicious because they regard this outside work as merely an overhead carrier. They frankly acknowledge that they not only do not expect to make any profit on such work, but rarely charge even all of the overhead.

## Commercial Shops Present a Real Problem

The commercial shops we will call Group "C." This is the group in which we are primarily interested. This group produces forgings which are usually sold unmachined to customers who subsequently perform the finishing operations. Their success, unlike that of the shops in Groups "A" and "B," depends entirely upon the profit that they can make from a forging operation. The forgings are made, in all respects, in accordance with the customers' blue prints. The number of forgings required on any particular order is determined by the number of assemblies sold by the customer. Therefore, the volume of any one part depends entirely upon the sales department of the customer, and cannot be increased by any sales effort of the forge shop itself.

Let us consider the possible available customers for the commercial shops. According to the Department of Commerce survey, Table 10, Page 22, it is apparent that 80 per cent of all forgings are used for motor cars, agricultural implements, and railroad forgings. This measures the extent of the drop forge market available to all three groups. All of the large volume motor car manufacturers and most of the agricultural implement manufacturers and railroads have their own forge shops. Also, most of the companies supplying them with assemblies such as motors and axles have their own forge shops. These facts place the commercial drop forge shop in a very difficult and critical position.

## Automobile Industry Uses Bulk of Tonnage

Let us turn our attention to the automobile industry, which in itself consumes 66.21 per cent of the entire forging tonnage. Automobile manufacturers can roughly be grouped



in three classes: those which produce all their own forgings, those which produce some and buy the balance, and those which purchase all their forgings. The companies which make automobile assemblies such as motors and axles, for the most part, manufacture their own forgings. Companies in this parts class which produce their own forgings also produce certain forgings for other companies. This unfortunate fact more than balances the possible requirements of those plants of this type that have no forge shops and would, therefore, be purchasers of forgings from the commercial shops.

In the year 1931, there were produced in the United States approximately 2,400,000 motor cars. A very careful check of all the companies involved in this production indicates that, at most, only 20 per cent of the total forging tonnage requirements involved in this production were available to the commercial drop forge shops. The balance of these forgings were made by the automobile companies, themselves (Group "A"), or by the parts companies in Group "B." This is a most serious situation, looked at from the point of view of the commercial drop forge shop. *The bulk of all the forgings used in the United States are not available to the commercial drop forge shop.*

The commercial shops, or Group "C," account for at least 35 per cent of the forging tonnage according to Table 3, Page 11, of the survey report. This figure, supplemented by the tonnage production of those semi-commercial shops which regularly seek commercial forging business, would easily bring this percentage up to 50 per cent. There is only one answer to this situation, and that answer is the scrapping of a very large amount of equipment now installed in commercial drop forge shops.

It is true that a revision of our present anti-trust laws might help the situation by making it possible for the units to agree not to sell below normal cost, as such cost may be determined by uniform accounting principles. Obviously even this, by itself, is not enough to insure profitable operations in the drop forging industry, for no company can hope to reach normal costs without volume.

#### Supplementary Relief is Urgently Needed

With such a tremendous overcapacity as there is in the commercial drop forge shops, supplementary relief is imperatively needed. There simply is not enough business to go around, and produce a profitable operation, with the present excessive available capacity. Therefore, no such legal panacea can be of any avail unless it is coupled with the control of production by the reduction of available equipment.

Another hope might lie in the development of a market in a new industry such as the aeroplane. Much has been accomplished in this direction

by a few in the commercial forging group, but the volume is, unfortunately, insignificant.

Some companies, by intensive specialization, can produce a better forging product at lower cost than the average, and in fact better and cheaper than many motor car companies and parts manufacturers, if the facts could be known by having their costs and those of the forge divisions of motor car and parts manufacturers paralleled on the same basis of accounting.

Others, through mechanical genius and operating ingenuity, have been able to develop new uses for forgings, but what is gained in this respect is lost to other industries which, by the same process, are able to substitute their material for ours.

At the present time we are faced with most vicious underselling within the industry. This is a very serious matter, and accomplishes nothing except to lower the general price level. It attracts no new business to the drop forge field for the commercial forge shop. Most of the vicious underselling is caused by unintelligent competition.

Vicious underselling sometimes can be intelligent, under conditions when the purpose in view is definitely understood and there are sufficient funds to support it; but it is unintelligent when one intentionally refuses to recognize competitive superiority in another, and equally so, though entirely innocent, when estimated costs are the result of accounting costs based on faulty principles.

#### Percentage Expense Allocation is Misleading

From time immemorial, it has been the practice in many industries to allocate all expenses to individual articles on the basis of the productive labor charged against these articles. Such a system, commonly called the "percentage method," can be in perfect balance, but the answers obtained in the drop forge industry, by such a method, are very far from the truth and often actually ridiculous.

Applied in the drop forge shop, this method accounts for no difference in the cost of operating steam hammers, board hammers, and upsetters, as very different classes of equipment; to say nothing about the variance in the operating cost of the different sizes of producing equipment in each class. Steam hammers, for example, range in size from eight hundred pounds to sixteen thousand pounds falling weight.

Most of the companies in Groups "A" and "B" use this percentage system, which really has nothing to recommend it in the acquirement of true forge costs. In the operation of the many processes necessary for the completion of their product, however, they apparently feel it necessary to know merely their total forging cost per car, truck, tractor, or assembly

produced. Perhaps competitive pressure among them will eventually make it necessary for them to undertake the same cost study that the commercial forge shops have been compelled to make.

It is a very unusual thing for a motor car company to abandon an operation and permit equipment to stand idle. It would appear that, even if these companies could be shown that their forgings are costing them more to produce than they figure, they would still continue to make them at a loss, feeling that they, at least, were carrying some overhead. Probably the only way by which these companies can be persuaded from making their own forgings is to actually agree to purchase their old equipment from them. This is a very expensive proposition, and its successful conclusion is in many cases problematical.

#### Underselling, Although Innocent, is Harmful

As previously stated, some of the companies in Group "B," the so-called parts shops, regularly do a certain amount of special forging business in competition with the strictly commercial forge companies. Others periodically look for special forging business when their own product is at low ebb, with the result that such of those companies as happen to use the heretofore mentioned yardstick percentage method, bring into the situation that brand of "vicious underselling" which, though innocent, as much of it is, still is extremely disastrous to everybody.

Since it is apparent that it is impossible to materially increase the volume of business available to even approach the leveling of market with equipment, the only alternative is to somehow level the equipment to its market. *This is our imperative duty.*

The Government report, page 138, finds as follows: "The actual production in 1928 and 1929, the years of the greatest output, were respectively only 53 and 59 per cent of the capacity figure. In other words, in order for production to approximate present capacity, it would be necessary for the output to increase about 70 per cent above the 1929 level."

#### Combine, Discard and Pool

With such a condition confronting it, it is, therefore, the duty of every commercial forge company to find at least one other of its kind with which it can combine, discard about half the equipment, and pool the business in one plant with the remaining equipment of both. In the general management personnel of many commercial forge shops are men whose principal ability is along merchandising rather than factory operating lines, and vice versa. If these characteristics in two companies could be combined into one company, an ideal set-up is accomplished, and furthermore, the best of the factory operatives, such as die

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## What Metal Has Done— Metal Can Do



**E**FFICIENCY, of course, is exemplified in these "all metal" kitchens with their electric and mechanical time saving auxiliaries. But efficiency, while important, is not the big point.

The big point is that the modern metal kitchen designer has "licked" the problem of eye appeal. There is no woman, probably, who would not prefer to own or to work in one of these modern culinary palaces.

If metal kitchens can be made things of beauty, why not metal houses? They can and will be. And when our metal house designers do for exteriors what their brethren have accomplished for interiors, the metal house will have been placed on a cyclone-proof foundation.

(Photos, Courtesy, International Nickel Co.)

## Machine Eliminates Hand Work In Preparing Carbide Wire Drawing Dies

FOR cutting and polishing cemented-carbide wire drawing dies the H. J. Ruesch Machine Co., 404 Mulberry Street, Newark, N. J., is manufacturing, under the Haddow patents, the machine illustrated. In making a finished die from an incased rough nib, this machine will, it is stated, perform all necessary operations, eliminating hand work.

A vertically-reciprocating spindle, which can be swiveled to obtain a maximum 45 deg. included angle in the die, holds the straight wire or tapered rod. A revolving split collet, which can also be swiveled, holds the die while being cut. The approach angle, the reduction area angle, and the bearing are cut at one setting of the die in the chuck, assuring concentricity of all diameters. Except in the case of small diameter dies, the relief angle also is cut in the same setting. All of the angles and the bearing can be cut with a straight rod or wire except in the case of very small dies, where a tapered rod is advantageous. When a tapered rod is used, one rod will cut any desired angle up to 45 deg. As this revolving and oscillating tapered rod is in constant contact with the surface being cut, there is no grooving, due to wear. These features are emphasized as reducing tool costs markedly.

Final polishing and rounding of the edges of the die angle junctions are accomplished by means of a charged



flexible wire, held firmly in the upper and lower spindles. A very high polish, resulting in longer die life and lower power consumption, is said to be obtained.

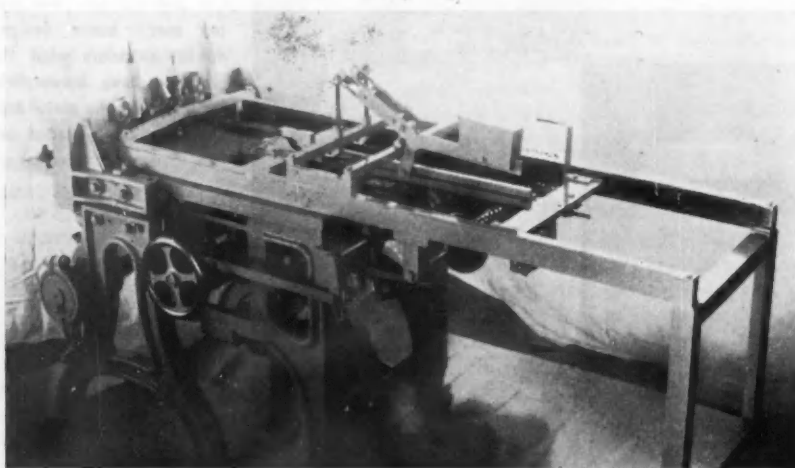
Rapid cutting is a feature, the machine being said to have cut 0.010 in. per min., using 280 Boron Carbide abrasive.

Ball bearings are used throughout. Micrometer handwheel adjustment and a split collet for 2 in. diameter casing are furnished. The drive is by a ¼-hp. 1760-r.p.m. motor. The machine is 16 in. wide, 21 in. deep and 30 in. high, and weighs 210 lb. net.

## Blanking Shear With Automatic Sheet Feed

A BLANKING shear arranged for feeding sheets automatically to the shear has been placed on the market by R. H. Brown & Co., New Haven, Conn. It is designed for blanking hack saw blades and other narrow strips from stock ranging from 0.010

to 0.031 in. in thickness, from 8 to 15 in. in width and up to 24 in. in length. The machine holds 200 sheets, 0.025-in. thick, at one setting; on thin gage metal, blanks are said to be cut at the rate of 120 per min. Sheets are loaded by hand and fed automatically to the jaws which carry them through the blanking operation. The carriage returns and picks up another sheet automatically, and all



scrap is removed from the machine automatically.

Cams, clutches and other wearing parts are made of steel, and are hardened and ground, and the carriage is ball bearing equipped. The table has an adjustable feed, and can be adjusted to different widths of blanks as required.

## Roll Scouring Brick Has Rounded Corners

A NEW roll scouring brick, featuring rounded corners and controlled structure, has been brought out by the Norton Co., Worcester, Mass. Advantages from the rounding of corners include reduction in cross breakage and in spalling or chipping, with longer life because of less chipping breakage; also reduction of scratching due to absence of sharp corners.

Exact control of the spacing of the abrasive grains is attributed to the Norton controlled-structure method of manufacture. By wider or more open spacing between the abrasive particles a faster scouring action is obtained without resorting to a coarser grit size. The pores or chip clearance is also greater, permitting a deeper cut. Because of this clearance and freer cutting action a stronger bond can be used, which results, in turn, in longer



brick life. Likewise a comparatively fine grain is used which gives a good finish and shine. The proper structure distributes induced heat stresses which ordinarily result in breakage. These rounded corner bricks are available for both hot mill and cold mill requirements.

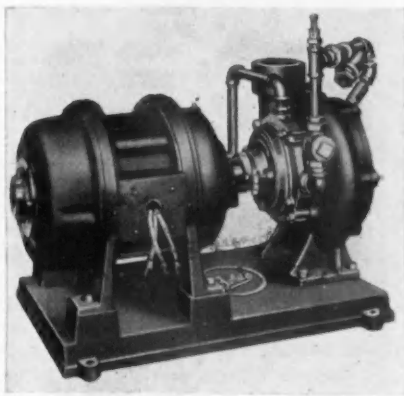
## Magnetic Balance for Austenitic Steel

Research Paper No. 532, by Raymond L. Sandford, Bureau of Standards, describes an experimental model of a magnetic balance for measuring the attractive force between a permanent magnet and a specimen of austenitic steel. Experiments indicate that such an instrument should have considerable practical value for the inspection of corrosion-resistant austenitic steel.



## Buffalo Single-Suction Self-Priming Pump

WITH the introduction last year by Buffalo Pumps, Inc., Buffalo, of the Buffalo self-priming double suction pumps for general service and sewage work, inquiries developed for a single suction self-priming pump.



Pump shaft, an extension of the motor shaft, carries impellers for both pump and primer.

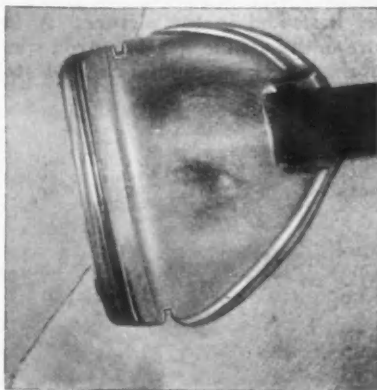
The result is the pump shown in the accompanying illustration.

The self-primer is built under license from the Nash Engineering Co. Two types of impellers are available; on sump service, or wherever liquids are not clear, the open type is recommended, while for all services where clear liquids are pumped, the inclosed impeller is commonly supplied. For general service, bronze impellers are used, but where required, cast iron or other metal is furnished.

The self-priming device is mounted as an integral part of the pump casing. The pump is built in several sizes in capacities up to 450 gal. per min. and for heads up to 150 ft.

## New Goggles Feature Cup Transparency

GOGGLES having cups made of transparent material that enables the wearer to see through them have been brought out by Willson Products, Inc., Reading, Pa. It is stated

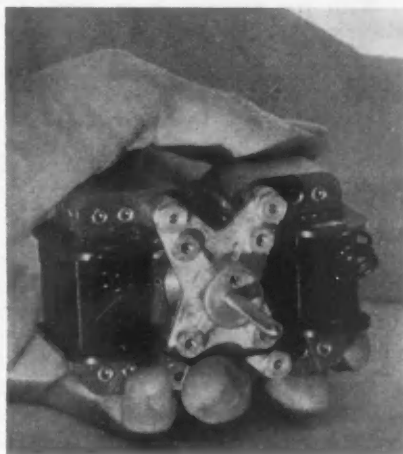


that light passes through the walls of the cup undimmed, permitting entirely normal eye condition; the "blinder" feeling is eliminated and the operator obtains a visual comfort unusual with goggles.

The goggle is sturdy, has strength to withstand impact and is spark proof. Light weight, roominess and better ventilation are other features emphasized. The goggle is intended for all service use and it can be worn equally well with or without spectacles.

## Midget Electric Motor for Quiet Running

SHADED-POLE unidirectional induction electric motors operating at lower speeds than heretofore offered are now being made by Barber-Colman Co., Rockford, Ill. This new motor has four poles instead of two (as in the previous design) and therefore runs at approximately one-half the speed of its predecessors. It may be used for driving a variety of



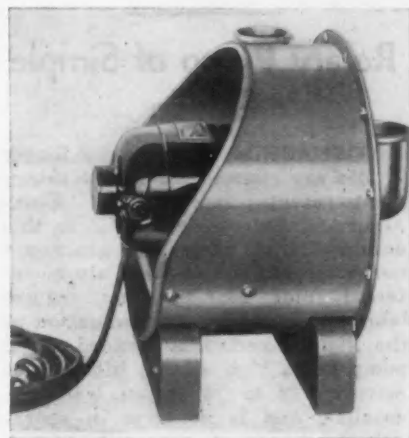
mechanisms, such as pumps and advertising devices, but it is especially suitable for driving fans for cooling, exhaust, or heating, as it will pull a fairly large blade without producing the objectionable noise of high tip speeds.

With the four-pole construction, the "synchronous" speed is 1800 r.p.m. as compared with 3600 r.p.m. of other models. Actually the no-load speed is about 1750 r.p.m., due to the necessary slip between the rotor and the rotating field. At full load the motor delivers 0.0060 hp. at 1400 r.p.m. with an input of 36 watts at 115 volts 60 cycles. The starting torque is 0.150 in.-lb. The current drawn by the motor when stalled is but little more than when running at full load, with the result that there is no danger of the motor burning out if it becomes stalled.

Outside dimensions of the Barcol midget motor, as it is called, are  $3\frac{1}{2} \times 2\frac{1}{4} \times 2\frac{7}{16}$  in. The motor can be made to suit a variety of voltage and frequency requirements.

## Turbo-Compressor Weighs 40 Pounds

A REMARKABLY small multi-stage centrifugal compressor—12 in. in diameter and 40 lb. in weight—is now built by the Spencer Turbine Co., Hartford, Conn., as a standard product. The unit, which is self-contained, will deliver 75 cu. ft. of air



per minute at 12 oz. pressure. The motor is of  $\frac{1}{3}$  hp., for alternating or direct current.

The compressor is used for individual operation for heat-treating equipment, gas boosters and other devices requiring low-pressure air.

## New Alloy Resists Hydrochloric Acid

THE Duriron Co., Inc., Dayton, Ohio, announces the development of a new metal alloy that is almost entirely resistant to hydrochloric acid at all concentrations and all temperatures up to the boiling point. Hydrochloric acid, widely used commercially, is one of the most vicious acids for attacking metals. Heretofore, the only metals available for complete resistance have been very costly.

"Durichlor" (the name of the new alloy) is comparatively inexpensive and is being used to make pumps, valves, pipe, fittings, jets and other pieces of chemical handling equipment.

## Uses Stainless Steel in Valve Packing

TO meet the requirements of higher steam pressures, the Yarnall-Waring Co., Philadelphia, has developed a new form of laminated packing for use in Yarway seatless blow-off valves. This packing consists of several stainless steel rings with long fiber asbestos packing between them. At the time of assembly the mass is compressed and heat treated, so that the finished ring is a complete unit of laminations of the steel and the as-



bestos, suitable for high pressures and temperatures.

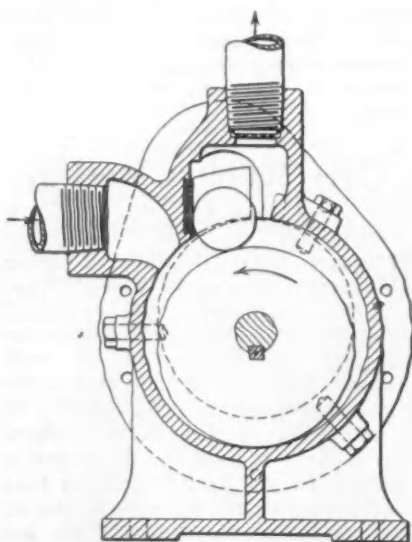
In the company's research laboratory, the packing rings have been subjected to blow-down tests at various steam pressures, ranging from 450 to 2100 lb. The tests were conducted with valve throttled, so that the operating conditions were more severe than those encountered in normal blow-down service.

## Rotary Pump of Simple Design

**I**NCREASED efficiency and longer life are claimed for a new rotary pump patented recently by C. Einar Anderson, Eatontown, N. J. In this design sliding vanes and gears are not employed, and as there are no internal rotor bearings that require lubrication, possible contamination of the liquid handled is avoided. The pump has a high suction lift without priming, 22 to 23 ft. on water or gasoline, and is noiseless in operation. Absence of perceptible wear, even when the pump is made entirely of bronze, is attributed to the elimination of sliding friction.

The pump will operate as a compressor or vacuum pump, as well as handle fresh and salt water, oils, acids and other liquids. In tests, a ½-in. 5-gal. per min. pump of this design is said to have attained an overall efficiency of 80 per cent, indicating that the curve for larger pumps of this type should show even higher efficiencies.

As shown by the accompanying sketch, the displacement elements consist of but two moving members, namely a rotor and a rolling abutment. The rotor is mounted eccentrically on the shaft and has an extended cut-off surface which conforms to the periphery of the cylinder bore. There is a clearance between this surface and the cylinder bore which, it is stated, prevents any wear of the bore. The abutment consists of a free roll-



ing roller placed on top of the rotor on the discharge side. The roller is guided by and makes contacts on one side with a non-metallic insert placed in the wall of the housing as shown. Positive continuous rolling motion is imparted to the roller abutment by the rotor, and the roller in contacting with both the rotor and housing wall provides a tight seal between the inlet and the outlet side of the pump. It is stated that because of the rolling contact there is no perceptible wear on the periphery of rotor or roller.

The pump is duplexed with a common intake and common discharge for each displacement chamber.

## Pipe Machine Driven by Portable Drill

**A** PORTABLE electric pipe machine which comprises a Beaver power adapter, base, and full range of die heads, from ¼ to 2 in., and may be operated by any standard make of electric or air drill has been added to the line of the Borden Co., Warren, Ohio.

With the average ½-in. "special" electric drill, pipe up to 2 in. in diam-



eter can be threaded and with a ¾-in. heavy-duty drill pipe up to 6 in. can be cut and threaded. The operating speed of the die head is from 10 to 15 r.p.m., depending upon the drill, line voltage and other conditions.

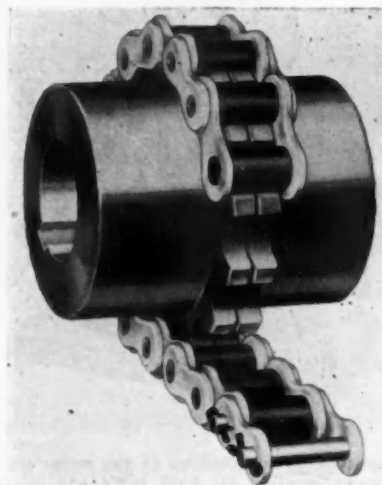
The power adapter will cut right or left-hand threads, and is reversible for backing off. The driving spud to fit all standard drill chucks is furnished. The adapter may be used with or without the base. The feet of the base are cored out to receive legs of standard 1-in. pipe to form a substantial work bench. The whole outfit can be disassembled easily, transported in small space and handled by one man. The weight of the power adapter is 27 lb. and of the base, of an aluminum alloy, 14 lb.

**T**HE displacement elements of this pump consist of two moving members—a rotor and a rolling abutment.

**T**HE Johnson variable reducer gives infinite speed control from zero to the upper limit.

## Flexible Coupling Employs Silverlink Roller Chain

**T**HE Link-Belt Co., Indianapolis, is offering the flexible coupling illustrated, in which the recently-announced "RC" silverlink roller chain

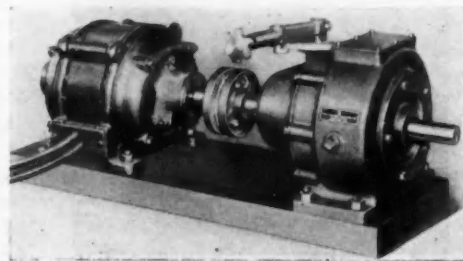


will be used. This coupling consists of two cut-tooth sprocket wheels, or coupling halves, and a piece of roller chain to connect them, all working surfaces being machined to close tolerances. A pin-and-cotter link facilitates coupling or removing the chain when desired.

Where the operating conditions suggest the advisability of protection from dust, dirt or other adverse conditions, the coupling can be inclosed in either a stationary or revolving automatically-lubricating oil-retaining casing.

## Speed Reducer Has Ready Control

**T**HE Johnson variable reducer, representing four years of development, is announced by the Smith Power Transmission Co., Penton Building, Cleveland. The illustration shows the unit connected to a 1-hp. 1200-r.p.m. motor. The reducer is a mechanical device giving an infinite speed control from zero upward. It runs in a bath of oil and its compactness and self-contained character are indicated in the picture. A feature is the visible speed control, which affords quick manipulation and stopping.



# F. D. R. Dusts Off the Big Stick for Economic Nationalism

By G. L. LACHER

**E**CONOMIC nationalism, long condemned by Democracy, is now finding favor among its leading spokesmen. Within the short period of one week Walter Lippmann, Bernard Baruch and Prof. Raymond Moley have publicly voiced their conviction that the battle against the depression will be won on the domestic front.

Said Mr. Lippmann: "According to Carl Synder of the New York Federal Reserve Bank, leaving out wheat, rice, potatoes and rye, the United States consumes about 40 to 45 per cent of the world's raw materials. . . . Quantitatively the largest part of the world depression is within our own frontiers, and a frontal attack upon the American depression is a major attack upon the depression all over the world."

Said Professor Moley: "World trade is, after all, only a small percentage of the entire trade of the United States. This means that our domestic policy is of paramount importance."

## Inconsistent Policies

Mr. Baruch went even further. He frankly admitted that the administration's industrial control program is inconsistent with its previously avowed intention to reduce the tariff. The control plan, in his view, "is certain to raise American costs even further above world costs, and to require additional protection against importations. Coupled with the further effect of the farm bill to raise prices, all this struggle suggests inconsistency in domestic policy with any plan to lower tariffs in the world economic conference."

Mr. Baruch has recognized the logic of events since March 4. One of the first moves of the present administration was to insulate our monetary system from subversive disturbances of foreign origin, and the results have been beneficial. The farm relief act, which followed the gold embargo, is patently a protective measure—far removed in spirit from the principles of free trade. And finally the industrial control bill, now pending, implies such a thorough-going regulation of all phases of domestic industrial production as to make a material reduction of tariff rates unthinkable.

The elimination of vicious price

cutting in this country would be a futile gesture if we lowered the barriers to foreign price cutters. Obviously our government cannot control the prices, let alone the wages and working conditions, of plants in other countries. And lacking such control, it is not likely to permit such external influences to imperil its internal program.

## Foreign Price Cutters Not Subject to Control

True, it is hard to reconcile this reasoning with the reported purpose of the President to ask Congress to give him broad discretionary power to lower tariff rates in agreement with other countries. But it is possible that he really expects no extensive downward readjustments of tariffs to come out of the world economic conference, yet sees the advantage of having power to make specific rate changes, in cases where domestic products will suffer the least harm, in exchange for compensating reductions by foreign countries.

Be that as it may, it seems clear the administration, whether by design or by force of circumstance, has ceased to await the London conference for a depression cure and has definitely committed itself to self-help.

Any program of recovery implies control and adequate control cannot be hoped for in a world of many governments and many peoples. Control of our monetary system proved impossible until its ties with other moneys were severed. And control of our industrial system calls for similar isolation. Whether the purpose of the Wagner bill can be achieved is another question, which cannot be discussed within the limitations of this article. Certain it is that the aim is justified.

## Economic Concepts Have Changed

This becomes apparent if our present plight is viewed from the standpoint of changed economic concepts. Classical economics recognized only buyer and seller. The buyer had to beware, but if he succeeded in driving down prices to new, unheard of levels, he was the gainer and others had no cause for complaint. Today we add a third party, labor, to the principals

of a transaction. For labor, we have learned, is not a mere commodity; on the contrary, it is both seller and buyer—seller of its contribution to the production of a commodity, buyer of products which other labor has helped turn out.

The older economics conceived of business as an exchange between traders. The newer economics sees business as an exchange between producing organizations in each of which capital, labor and management are partners. Freedom of competition, in the older concept, meant the liberty of traders to drive as hard a bargain as possible. Today, freedom of competition too frequently means freedom to go bankrupt or to force wage rates to "sweat shop" levels.

## The Government Steps In

Most American employers believe in decent wages and most American employers would gladly pay them if competitive conditions would permit. And it is precisely for the purpose of correcting vicious competitive practices that the Government proposes to introduce industrial control. The price cutter and the wage slasher will both be driven into line, to the end that buying power and living standards may be simultaneously lifted to more normal levels.

Whether or not the bureaucratic machinery required by this act will be so cumbersome and so complex as to prevent its effective administration cannot be foretold. But it is at least clear that a familiar big stick has been dusted off by a distinguished fifth cousin.

## Illinois Employment Up

Illinois industrial employment gained 7/10 of 1 per cent while payrolls increased 2/10 of 1 per cent between mid April and May 15, according to the Illinois department of labor. The Chicago area showed gains of 1.6 per cent in employment and 1 per cent in payrolls for the same period. With the monthly averages for 1925 to 1927 as the base equal to 100, the employment index for April, 1933, stood at 56.2, a decline of 9.2 per cent from the same month last year, while the payroll index was 36.5 or 21.7 per cent under the same month of 1932.



# Steel Construction Institute Awards Bridge Plaques for 1932

**A**WARDS for the three most beautiful bridges built during the past year have been made by the American Institute of Steel Construction to the High Level Viaduct crossing the Hackensack and Passaic Rivers in New Jersey; the French King Bridge over the Connecticut River near Greenfield, Mass.; and the Bryan Bridge over the Niobrara River at Valentine, Neb.

The monumental bridges, two of identical design, serve the highway viaduct over the Jersey meadows leading to the Holland Tunnel. The McClintic-Marshall Corp., Bethlehem, Pa., fabricated and erected the two bridges, while the approach viaducts were fabricated by the American Bridge Co., Pittsburgh, and the Phoenix Bridge Co., Phoenixville, Pa. The Lorain-Carnegie Bridge at Cleveland, Ohio, fabricated by the Mount Vernon Bridge Company, Mount

Vernon, Ohio, was accorded honorable mention.

Simpson Brothers Corporation of Boston were the contractors for the substructure of the French King Bridge, judged the most beautiful of bridges costing between \$250,000 and \$1,000,000. McClintic-Marshall Corporation were the contractors for the superstructure. Honorable mention in this class went to the York Street High Level Bridge, Hamilton, Ont., fabricated by the Hamilton Bridge Co.

The Bryan Bridge, judged the most beautiful of bridges costing less than \$250,000, was fabricated by the Paxton & Vierling Iron Works, Omaha, Neb. Honorable mention in this class went to the Canterbury Street Bridge over Morton Street, Forest Hills, Boston. This structure was fabricated by the American Bridge Co.

## Century of Progress Exhibits Near Completion

Striking displays at the Century of Progress Exposition, which opens in Chicago, May 27, will include several by companies in the metal-producing and metal-working industries. Those now nearly completely set up include the exhibits of the Union Carbide & Carbon Corp., and its subsidiaries, the Link-Belt Co. and the Hyatt Roller Bearing Co.

The Union Carbide & Carbon Corp. exhibit, in the Hall of Science Building, will show a diversity of products and processes, supplemented by operating models and dramatized diagrams. Non-ferrous alloys and other metallurgical products will be shown; also compressed gases, such as oxygen for medical use and for welding, and acetylene for lighting; and synthetic organic chemicals in their many industrial uses. The "age of plastics" will be represented by the newly developed Vinylite. The Fair management is planning to set up in the Hall of Science a huge "Periodic Table of Elements," in which will be collected, for the first time in one place, specimens of all the known chemical elements. Almost half of these specimens are being furnished by the Union Carbide & Carbon Corp.

Located in the mineral industries and industrial engineering section of the General Exhibits Group, the space occupied by Link-Belt Co. will be inclosed by large ornamental models of conveyor links that reach to the ceiling. The link forming the main entrance will have an entrance width of 22 ft. By means of dioramas and

translite illustrations the company will show modern material handling methods. There will be 25 dioramas, which are combinations of oil painting, in the background, and a miniature model, in the foreground. They will be mounted on display cases built to accommodate full size products. The translites, or large illuminated colored glass photographs, depict conveyor installations employing various types of Link-Belt chain.

On a five-sided obelisk at the center of the exhibit will be displayed chain drives, speed reducers, P.I.V. variable-speed transmissions, and other drives. A large oil painting will show a composite view of the company's factories and warehouses.

The Hyatt Roller Bearing Co. display, housed in the General Motors Building, will include cutaways of Hyatt-equipped industrial units, agricultural machinery and railroad journal boxes; also automobile transmissions and rear axles. An outstanding feature will be a 6-ft. illuminated miniature of the 21-structure Hyatt plant at Harrison, N. J. Two large mural paintings will form the background. One, a composite picture of industry, portrays the use of Hyatt bearings in steel, paper and textile mills, in machine tools, industrial trucks, cranes and other machines; the other portrays motor cars, trucks, buses, railroad trains and other equipment in which Hyatt bearings are employed.

Westinghouse Electric & Manufacturing Co. has recently held a preview of its exhibit at A Century of Progress, Chicago. The display has been so arranged as to give a general view of a century of electrical history and

a conception of the progress along the path of industrial and manufacturing achievement. The spectator is not only carried through the past century of progress but is also afforded vision of some of the developments that may come in the next 25 years.

The exhibition at the Century of Progress in Chicago of The Electric Storage Battery Co. will be located in Booth No. 9 in the Electrical Group.

Entering the booth the visitor will face a painting covering the entire rear partition, portraying country, city and industrial atmosphere, together with roads, automobiles, railway, transportation, etc. Across this scene there will be a regular cycle of change in lighting, giving the impression of transition from night to day, tying up to the expression that "Every Day in Some Way You Use an Exide Battery."

On either side of the booth there will be a series of large paintings illuminated from the rear, which will show various storage battery applications, such as railway, car-lighting and signals, telephone, electrical vehicle propulsion, starting, lighting and ignition, emergency lighting, submarine and other government uses, airplanes, etc. These colored transparencies will light up in regular order, and the type of battery which is used for the particular service will be displayed directly beneath the illuminated painting.

There will also be displayed a section of the Exide Battery taken from the "City of New York" which was used by Byrd on his Antarctic trip, together with the Exide Battery which was used by Byrd on his flight over the North Pole.

Armstrong Brothers Tool Co., Chicago, will have a rotating display exhibit in the North Pavilion, General Exhibits Building, at the Chicago World's Fair adjacent to that of the United States Steel Corp. Armstrong tool holders, lathe dogs, clamps, ratchet drills, high-speed steel, Armide, drop forged wrenches and pipe tools will be displayed.

## Purchasing Agents to Meet at Boston

The eighteenth international convention and Informashow of the National Association of Purchasing Agents will be held June 12, 13, 14, and 15, at Hotel Statler, Boston. The slogan for this year's convention is "Build on Fundamentals"—very appropriate in view of the unsettled economic conditions.

The program will be devoted to such subjects as "The Problem of Cutting Inventory Costs," "Today's Buying Policies," "Can Buyers Stabilize Markets?" etc. The members will also make plant visits.



# Worth Mill Produces Light-Gage Heat-Treated Plates

HEAT treatment of steel plates is now a procedure at the Claymont, Del., works of the Worth Steel Co. A continuous heating furnace has been installed in connection with one of the plate mills at a point in the mill tables substantially midway between the main rolls and the straightening rolls. The completed plates may now be brought to a normalizing temperature and delivered under controlled conditions to the straightening rolls so that effective flattening can be assured without waviness or buckles.

That cold-working stresses are relieved and uniformity in quality is obtained are shown by the flatness of the final product and the results of tensile tests of specimens of plates all rolled from the same heat. Before heat treatment, the tensile strength of the steel as rolled ranged from 56,600 to 64,500 lb. per sq. in., while after passing through the heating furnace, the range had narrowed down to 55,500 to 57,000 lb. Elongation was increased 1 to 4 per cent, depending on the finishing temperature.

The mill in which the furnace has been set up is devoted largely to the production of light-gage plates from  $\frac{1}{4}$  in. in thickness down to No. 10 gage material, inclusive, and in widths up to 100 in. The plates are rolled in accordance with standard mill practice with the usual variations in finishing temperatures and the resultant variations in physical properties shown by the "as rolled" tests reported. As a result of the heat treatment, the wide variation has been corrected, as stated.

The furnace is of the continuous through type, 50 ft. in length. The plates are carried through the furnace on alloy chains driven from the exit end and supported on alloy rollers spaced regularly throughout the furnace. The speed of this chain may be varied from a minimum of 20 ft. a min. to a maximum of 80 ft. a min. The furnace is oil fired with five burners installed in each side wall. These burners are automatically controlled by means of thermocouples let in through the roof so that a uniform

furnace temperature may be maintained at all times. A continuous record of the furnace temperature is obtained by means of two recording pyrometers.

To insure an even distribution of heat through the furnace, two propeller-type alloy fans are placed immediately under the arch about 17 ft. from each end. These are driven by vertical motors supported above the furnace.

In addition to the recording pyrometers, which provide a permanent record of furnace temperatures at all times, the furnace is equipped with a special recording meter which provides a record of the progress of every plate through the furnace. This meter records the speed of the chain and also the exact time each plate enters and leaves the furnace. This latter record is obtained by the use of photoelectric relays located at each end of the furnace.

With the flexibility of control which has been provided both for temperature and speed of travel through the furnace, it is possible to set up a definite schedule for the proper heat treatment of the various gages and grades of material produced on this mill, thus to insure a uniformity of physical properties and flatness.

## Refined Fuels, So-called, for Heat Treating

IN discussing refined fuels at a meeting in Hartford, Conn., of the chapter in that city of the American Society for Steel Treating, Robert M. Keeney, Connecticut Light & Power Company, Hartford, who has contributed frequently to trade journals and technical societies, said that the selection of the source of heat for heat treatment is an economic problem of overall costs and that the B.t.u. cost is only a part of the overall cost. The sources of heat of the highest form value are: Electricity, manufactured or natural gas, butane, and oil. Electricity and manufactured gas he terms refined fuels.

During the five years preceding 1930 we saw, said Mr. Keeney, the production heat-treating furnace gradually change from a simple equipment for application of heat to the work to a production machine handling material in the furnace with about as much ease as any labor-saving device operating at room temperature. Refined fuels played a very important part in this trend. Just as they led the way in that trend, they are now pioneering in control of atmospheres in furnaces.

In the electric furnace, control of atmosphere, beyond that inherent to

it, must be through the use of artificial atmosphere, continued Mr. Keeney. In the gas furnace, temperature control and combustion control, synchronized with pressure control, may produce the correct atmosphere for some processes, but in many the mixture of products of combustion with an artificial atmosphere may prove to be the solution. While gas lends itself more readily to accurate control of atmosphere than oil, it should be understood that it is really quite difficult to maintain uniform and continuous control of atmosphere at all times in a combustion furnace where the products of combustion are intended to provide the correct atmosphere. "In making this statement," said Mr. Keeney, "I do not refer to ordinary heat-treating operations as at present conducted but to the extreme refinement of atmosphere which present-day research contemplates."

The probable steps in the development of controlled furnace atmosphere which might even extend to most ordinary heat-treating processes, said Mr. Keeney, will be along the following lines:

1.—To control with artificial atmosphere, pending a more complete solution of combustion atmosphere.

2.—With the further development of the art, a combination of controlled combustion atmosphere and artificial atmosphere.

3.—Perhaps eventually complete accurate control of combustion atmosphere.

4.—At the start and for a number of years, refined fuels will exert a strong influence in the development of controlled furnace atmosphere.

Among the important developments in the control of atmosphere during the past three years are the following:

1.—Diffusion luminous flame combustion of gas for forging in which air and gas are not premixed but issue from the burner in separate layers so that the lower one of raw gas protects the stock and combustion takes place progressively with the formation of a luminous flame equal in luminosity to that of the oil flame. The stock is heated at the speed of the oil forge with a little scale or a total absence of scale.

2.—Continuous gas carburizing in a gas-fired muffle furnace, controlling atmosphere by mixing butane with the products of combustion.

3.—The Carbolon process of carburizing in the electric furnace with an organic oil providing the necessary atmosphere.

4.—The further development of the electric bell type furnace, first installed in Connecticut, for annealing steel sheets in a controlled atmosphere of producer gas, dissociated ammonia or nitrogen.

5.—The continuous electric annealing of strip steel in atmospheres of either producer gas, hydrogen or dissociated ammonia.

6.—The short cycle annealing of malleable iron in a gas furnace with controlled combustion atmosphere. Packing is eliminated and annealed castings are produced

in 48 to 60 hr. instead of 120 to 168 hr. One large production experimental furnace is now operating in Connecticut. An electric short cycle process has also been developed.

7.—The annealing of brass sheets and nickel silver tubing in gas furnaces with partially controlled combustion atmosphere to produce, not a bright anneal, but a non-oxidizing anneal equal to the former wood anneal in the case of brass, and far cleaner than the former oil anneal of nickel-silver. Two experimental production furnaces handling 6000 lb. per hr. are operating in Connecticut.

8.—The continuous electric annealing of nickel-silver, nickel and silver in an atmosphere of dissociated ammonia with a complete bright anneal and elimination of all pickling.

9.—The development of processes for the continuous bright annealing of brass in an electric furnace in an atmosphere of hydrogen or in a gas furnace in an atmosphere of cleaned hydrocarbon-gases, both methods requiring that the gas itself be at 1250 deg. F. to produce a bright anneal, although the brass may be annealed at as low as 800 deg. F.

10.—Continuous annealing of copper wire and sheets in a gas-fired muffle furnace, using an atmosphere of propane.

## Leaded Bronze Developed by Standards Bureau

A leaded bronze of high lead content, containing none of the so-called strategic metals, such as tin and antimony, which may be used as a replacement alloy for the usual tin-base bearing alloys in many fields of industrial service, has been developed at the Commerce Department's Bureau of Standards, according to Acting Director Lyman J. Briggs.

Commercial bronzes of high lead content generally contain tin to prevent lead segregation and to strengthen the matrix of the alloy. The usual maximum lead content of commercial leaded bronzes prepared by the ordinary foundry methods is about 28 per cent.

A series of copper-lead alloys containing 35 to 50 per cent of lead, together with small additions of several other elements, was prepared. The microstructures were studied to determine the effect of the various additions on the dispersion and distribution of the lead particles throughout the copper-base matrix. Individual additions of barium, calcium, zirconium, and sulphur showed promise of aiding in the prevention of segregation of lead in leaded bronzes under the casting conditions used.

Mechanical properties such as resistance to wear, to impact (Charpy), to pounding (repeated impact), and strength in compression, which are of significance in the use of this type of alloy as bearings, were determined in comparison with those of similar commercially available alloys. The resistance to wear was determined only at approximately 20 deg. C. (68 deg. F.). All other tests were made at 20 deg., 100 deg., 150 deg., 200 deg. and 250 deg. C. (68 deg.-480 deg. F.).

The results indicated that in most cases the silicon-zirconium-sulphur treated bronze, containing approximately 35 per cent lead, 0.4 per cent sulphur, 1.5 per cent silicon-zirconium alloy and remainder copper, had properties equal or superior to any of the commercial alloys tested, some of which contained up to six per cent tin.

Service tests were made on a set of connecting-rod and main bearings made of this alloy for use in airplane engines. These bearings were prepared by a commercial bearing manufacturer and were cast on steel backs. The main bearings, except for various amounts of scoring, stood up well. Some of the connecting-rod bearings failed, and metallographic examination of these bearings showed that the lead in several cases was segregated, often in streaks approximately perpendicular to the bearing face and of a length equal to the entire thickness of the layer of bearing metal.

The structure of both the used and unused main bearings made of the silicon-zirconium-sulphur treated leaded bronze differed from that in the connecting-rod bearings. The structure of the former was that which was characteristic of the specimens of this alloy prepared in the laboratory and upon which all of the laboratory tests were made. It is believed that this type of structure is essential for satisfactory results with this type of alloy and obviously can be secured in commercial bearings. The quite different structure existing in the connecting-rod bearings is believed to have resulted from factors in the manufacturing process which have not yet been sufficiently studied to permit exact control. These conditions are believed to have been in a large measure the cause of the bearing failures.

## Standards Association Issues Year Book

The 1932-1933 edition of the American Standards Year Book has been issued by the American Standards Association, 29 West Thirty-ninth Street, New York. Special interest attaches to this issue because it contains so many new approved standards or projects recently initiated, states Howard Coonley, president, in announcing the new edition. More projects have been submitted during the last two or three years to the A.S.A. for development than in any similar period in its history, it is stated.

The main section, or about half of the book, is devoted to a list of all projects having official status April 1. Projects and standards already approved are listed according to the branch of engineering or the industry to which they relate, and the listing includes the scope, sponsors and names of committee chairman and secretary of each project. The approved standards and the uncompleted A.S.A. proj-

ects are indexed separately. There is a list of members, and a list of co-operating organizations, the latter numbering about 475 and having some 2700 technical experts as their representatives.

Among the new national standards listed in the Year Book are:

Safety Code for Floor and Wall Openings, Railings, and Toe Boards (A12-1932)  
Steel Reinforcing Bars (A47-1932)  
Rotating Air Cylinders and Adapters (B5.5-1932)  
Foundry Patterns of Wood (B45.1-1932)  
Plain and Thread Plug and Ring Gage Blanks (B47-1932)  
Inch-Millimeter Conversion for Industrial Use (B48.1-1933)  
Shaft Couplings, Integrally Forged Flange Type for Hydro-Electric Units (B49-1932)  
Specifications for Lake Copper Wire Bars, Cakes, Slabs, Billets, Ingots, and Ingot Bars (H17.1-1932)  
Specifications for Electrolytic Copper Wire Bars, Cakes, Slabs, Billets, Ingots, and Ingot Bars (H17.2-1932)  
Methods for Screen Testing of Ores (Hand Method) (M5-1932)  
Safety Rules for Installing and Using Electrical Equipment in Metal Mines (M24-1932)  
Abbreviations for Scientific and Engineering Terms (Z101-1932)  
American Recommended Practice for Installation, Maintenance, and Use of Piping and Fittings for City Gas (Z27-1933)

## The Small House At the World's Fair

The new small house with the last word in modern efficiency equipment and the last word in modernistic furniture will be shown in a group of nine examples, all ready to live in, built as a display at the Chicago World's Fair.

There are two all-steel houses, three built of wood composition materials, one of stone composition, an all-lumber house, an all-brick house and a glass house.

The furniture varies from the extremely modernistic metal, glass and patent leather chairs and tables to more conservative adaptations. Wall coverings and draperies vary from cellophane to browned sheet copper.

All the modern house group are alike in having no cellars, having built-in garages, compact heating plants of various types, and by means of solariums and roof decks, making the utmost use of air and sunlight.

## Simplified Wire Diameters For Aggregate Screens

Division of Simplified Practice, Department of Commerce, announces that signed acceptances have been received from a sufficient number of manufacturers, distributors, users, and others interested in the simplification of wire diameters for mineral aggregate production screens to insure the general adoption of the program by the industry as a whole. As soon as the printed recommendation, carrying the indorsement of the Department of Commerce, becomes available, copies will be distributed.



# OFF THE ASSEMBLY LINE



## June Motor Car Production Promises To Be Near May Level

DETROIT, May 23.

THE retail automobile market is gaining rather than losing buoyancy as the month progresses, and total sales for May will far exceed those in April. There is no indication of a material decline in sales during the next 30 days, consequently manufacturers have not only revised their May production to a higher level, but also scheduled tentatively more cars in June than they earlier had expected to make. With assemblies this month likely to be well over 200,000 units, it now appears that June will show only a slight recession, if any. Steel releases the past week and those likely to be placed the coming week by the three leading makers—Chevrolet, Ford and Plymouth—reveal that little change is contemplated in the operating rate during June. At this time July also looks promising, although admittedly at least a mild seasonal drop in activities will occur during that month.

### Chevrolet Deliveries Increased

In the first 10 days of May Chevrolet's retail deliveries were considerably greater than those in the same period of April or in the corresponding period of 1932. It is understood that sales have been so good that the company expects domestic retail deliveries this month to touch the 60,000 mark, a figure which was not attained in any month of last year. This has resulted in the boosting of production schedules several times during May, with prospects that assemblies will exceed 70,000 cars and trucks. The June program calls for 65,000 to 70,000 units, although this probably will be revised as sales in the next two weeks give a further clue to the retail trend. Chevrolet bought the past week most of its steel requirements for June for its Flint plant and this week will place steel for its local forge and gear and axle plants. It is reported that the Detroit manufacturing divisions will carry over into the coming month finished parts for about 20,000 cars. It is noteworthy that all of the cars now being made by Chevrolet are of

the long wheelbase, de luxe series and that no steel orders for the smaller standard series are being placed. Chevrolet is said to have turned out little more than 10,000 of its standard models.

Pontiac, starting with a goal of 9100 units this month, will produce close to 11,000. Its June schedule will be 9000 to 10,000 cars. Pontiacs are now being assembled at five points: the Pontiac factory at Pontiac, Mich., and the four Chevrolet branch assembly plants at Tarrytown, N. Y., Atlanta, St. Louis and Oakland, Cal. Pontiac is considerably ahead of its production and sales record in the corresponding period of 1932. Oldsmobile began the year with the assembly of three six-cylinder cars for every eight-cylinder car produced; recently this ratio has been reduced to two to one. This is an indication that motorists are willing to pay more for cars than they were a few months ago. The Olds plant at Lansing is operating five days a week. Buick is manufacturing 250 cars a day five days a week. The demand for General Motors cars has been so brisk that buyers must wait a week or longer for deliveries of certain models.

### Reorganizations Are Going On

It is no secret that far-reaching consolidations of production departments and changes in personnel are now taking place in General Motors, carrying a step further the economies already effected. There are reports pertaining to the possible removal of considerable activities from Flint to Detroit, but those familiar with General Motors refuse to put faith in such stories. They point out that General Motors has at Flint not only a tremendous investment in plants and equipment, but also millions tied up in an extensive housing program for employees.

It is authoritatively stated that the Ford Motor Co. has no intention of altering its present manufacturing set-up at the Rouge plant despite recent persistent reports to the contrary. A spokesman for the company de-

clared today that the Ford steel mills will not be sold to any steel company. When Mr. Ford's attention was called to the fact that several steel companies might desire the Ford properties to equalize competitive conditions in the Detroit area, he said "They are a better equalizer if they remain in my hands." Some machinery from the Rouge plant has recently been stored at the Highland Park plant pending its further use. This gave rise to the unfounded story that removal of production to Highland Park was contemplated. Ford is making 2500 units a day at the Rouge plant and is employing 35,000 men. An increase in production is anticipated in the next two months. Ford is said to have made sweeping economies at the Rouge plant which enable the company to realize a profit on a far less volume of business than was possible a year ago. Ford is expected to purchase steel this week covering its June needs.

Plymouth is expected to break all factory records this month with production of 32,000 cars, according to an official announcement today. During the week of May 13 the company set a new high mark in retail sales with 5439 cars delivered to consumers. In the same period the factory shipped 7545 cars. May output for the industry is now estimated at 210,000 units. Dodge will go over the 10,000 mark this month. In fact, the entire Chrysler organization is reported to have set 45,000 cars as its objective in May, but will fall short of that figure by 6000 to 8000 units. Packard operated on Saturday of last week. This is the first time Packard has worked six days a week in more than two years.

Outside suppliers, especially makers of light castings, are getting an increasing share of work from Chevrolet, Chrysler and Ford. These are overflow orders which cannot conveniently and economically be handled within the plants of these three companies. Chrysler recently had to hold up shipments of materials into some of its factories because it was physically impossible to handle further cars and trucks to be unloaded.



# How the Industrial Recovery Act Will Operate

**W**ASHINGTON, May 23.—Washington will become the G. H. Q. of industry under the administration's pending National Recovery legislation. The power over industry to be vested in the President of the United States actually is almost limitless. Proposed as an emergency measure, the bill carries a two-year limitation. By proclamation of the President, the proposed act's provisions can be brought to an end whenever he sees fit. Whether or not the new "partnership" between industry and government may become permanent probably depends upon its administration and the results obtained. Should it prove effective in lifting the country from the depression and be found applicable to normal conditions, there are many who think it will be continued. Brigadier General Hugh S. Johnson, lawyer and manufacturer, close friend of Bernard M. Baruch, who headed the War Industries Board, is said to have been assigned to the job as director of the industrial recovery feature of the bill, as distinguished from the public works section.

Under this proposed legislation, business and industry would have to first get the approval of Washington before proceeding under the new setup, which involves an unprecedented relation between industry and government in peace times.

Nevertheless, the legislation has been urged by a large and prominent section of business, and it has been drafted with the aid of industrialists, organized labor leaders, together with administration officials and Senator Robert F. Wagner of New York, who introduced the measure. General Johnson had an important part in framing the bill.

## Codes Must Be Prepared in Three Months

Though it has been called "highly socialized" legislation, and putting industry under government control to a remarkable extent, it also gives to industry privileges that long have been sought, giving it a freer hand to cooperate within itself, through government supervision. This is to be done through trade associations, which will reach a status of importance never before attained. These associations, by reason of proposed relaxation of the anti-trust laws, will set up codes of trade practices for approval of the President—that is, through agencies established under an administrator. These codes, subject to Presidential approval, apparently can cover control of production, prices,

and even allocation of business, if that is desired, though many doubt that it will be. Approval, however, will at all times depend upon the setting up of minimum wages and agreeable working hours and conditions. The right of collective bargaining must be recognized, as must other conditions written into the legislation by organized labor leaders.

That the government agency will be deluged with codes of trade practices prepared by trade associations for industries and different units of industries is anticipated in the bill. For this reason three months' time is given for their approval or disapproval. They can, of course, be approved before that period. After the expiration of three months codes must be approved or disapproved within 30 days.

## Purpose Is to Increase Employment

The fundamental purpose of the Industrial Recovery bill, Senator Wagner points out, is to bring about an increase in employment at a level of wages which will afford a standard of living in decency and comfort. Essentially an employment measure, Senator Wagner said, the methods of accomplishing its object are, first, through cooperative action within industry itself, and, second, by direct Government expenditures on public works.

Taking up the industrial section, which he said is built upon constitutional grounds, Senator Wagner pointed out that the authority is centralized in the President. He is given power to designate or create the agencies to be used in carrying out the purposes of the section and to delegate his functions to such officers and agents as he may select.

The purposes of the bill, it was explained, are to be carried into effect through five principal methods:

- Voluntary codes
- Voluntary agreements
- Limited codes
- Codes imposed by the President
- Licenses

The emphasis of the bill was placed on the voluntary code.

## "Fair" Competition to Be Enforced

To this end, the bill authorizes any trade or industrial association or group to prepare and submit to the President for approval a code of fair competition which is intended to govern practices within the trade or industry represented. The trade or industry is thus given the opportunity to exercise its own initiative in formulating its own standards.

Approval of a code is conditioned upon the following findings:

That the association or group admits equitably to membership all who are engaged in the same trade or industry.

That it is truly representative of the trade or industry for which it speaks.

That the code presented will not promote monopoly.

That it will not oppress or discriminate against small enterprise.

That employees shall have the right to organize and bargain collectively through representatives of their own choosing.

That no employee will be required as a condition of employment to sign an anti-union contract.

That the employers will comply with the maximum hours of labor and minimum rates of pay and standards for other working conditions approved or prescribed by the President.

That the code will tend to effectuate the policy of the bill's title, devoted to the stimulation of employment through private cooperative effort.

Upon approval of the code it becomes effective for the entire trade or industry or subdivision thereof to which it applies. Thereafter the code and any action complying with its provisions are exempt from the provisions of the anti-trust laws. This exemption, Senator Wagner pointed out, is not a general one but is limited to those acts which are in compliance with the requirements of the code.

## Code Violation Will Be Criminal Offense

Violation of the provisions of a code by any one engaged in interstate commerce constitutes an unfair method of competition. It may be enforced by a criminal proceeding. The bill makes violation of any provision of the code a misdemeanor punishable by a fine of \$500. It may also be enforced by injunction proceedings in the Federal courts.

The President is authorized also to enter into and approve voluntary agreements relating to a trade or industry. These agreements need not apply to an entire trade or industry and do not bind any except those who are parties to the agreement. Every agreement, however, is subject to all of the conditions recited with respect to codes except those having reference to the membership in trade associations or groups.

The limited code provided covers one dealing solely with maximum hours of labor, minimum rates of pay and working conditions in a trade or industry.

In addition to the power to approve codes and make agreements, the President is authorized to prescribe codes of fair competition in any trade or industry where for any reason the trade or industry cannot or will not cooperate in the preparation of a voluntary code.

The President is further authorized to license business enterprises whenever he finds it necessary to make effective a code of fair competition or an agreement or otherwise to carry

# Self Regulation Puts Big Task Before Each Industry

into effect the policy of the title. The bill provides for public notice and hearing before a trade or industry may be subjected to license. After a trade or industry has been subjected to a license no one may engage in or carry on such trade in interstate commerce or in transactions effecting interstate commerce without first obtaining a license.

Labor provisions under voluntary codes are equally a part of the codes imposed by the President, agreements and licenses.

The bill makes the following provisions respecting the determination of hours, wages and labor standards:

Where the right to collective bargaining prevails employers and employees are given the first opportunity to agree upon maximum hours, minimum rates of pay and other working conditions. When such an agreement is approved by the President it acquires the character of a code.

Where no agreement can be reached or has been approved the President is authorized to investigate and to prescribe by way of a limited code or as part of a general code the standard of hours, wages and conditions.

Among miscellaneous provisions is one authorizing the President to establish an industrial planning and research agency. The Federal Trade Commission, also upon direction of the President, may make investigations to carry out the purpose of the measure.

Senator Wagner said that the purpose of the bill is not to abolish competition but to lift its standards and to raise its plane so as to eliminate destructive practices, unfair practices, competition in the reduction of wages and the lengthening of hours. Efficiency, rather than the ability to sweat labor and undermine living standards, it was declared, will be the determining factors in business success.

## I. C. C. Restores Ohio Coal Freight Surcharge

WASHINGTON, May 23.—The Interstate Commerce Commission has ordered restoration of the rail freight surcharge of 6c. per net ton of bituminous coal restored to shipments within Ohio. The surcharges are to be restored not later than June 10.

## Inland Steel Buys New Tin Mill

Inland Steel Co. has awarded a \$2,000,000 contract to Mesta Machine Co., Pittsburgh, for a new tin mill which will supplement the new strip mill which recently was completed by Inland Steel at Indiana Harbor, Ind. The project is being rushed and is expected to be in operation late next fall.

The plan involves the erection of a tin mill with an annual capacity of 250,000 tons.

WASHINGTON, May 23.—Industries, businesses and trades throughout the country are already preparing a widespread shift from their traditional individual economic control to self regulation under federal government jurisdiction.

Immediately upon passage of the Industrial Recovery act, it is expected that trade practice codes, now said to be in the course of preparation by many industries, will begin to pour in to Washington for approval. It is said that there will be a central agency set up by the President, with branches to pass upon codes for the various industries.

These codes, it is stated, will not only cover unfair methods of competition, hours of work, working conditions and rates of pay, but also control of production, allocation of orders and the establishing of prices. The Industrial Recovery act itself says nothing about control of production, but the bill leaves great freedom to the trade associations in preparing codes and the general understanding is that these elements will be proposed in codes. It is also a fact that President Roosevelt in his message of May 17 to Congress recommending passage of the Industrial Recovery act said, among other things, that it is intended to "prevent unfair competition and disastrous overproduction."

While nothing has been said publicly regarding allocation of orders, reports coming to Washington indicate that this feature is contemplated by at least a number of industries. The idea underlying the codes, it is said, will be to arrange uniformity of prices and equitable distribution of orders. The problems involved in this system are seen to be intricate but, it is said, will be met with as little delay as possible.

### Control of Output a Big Problem

Control of output apparently would be based upon current demands. How it would be adjusted among plants is not known here, whether by capacity or actual production over a given period. The same question has risen as to a plan of allocating orders, whether by actual capacity or production of individual plants. Capacity itself is recognized as a very indefinite term.

Establishing of prices, it is believed, will inevitably raise costs. The President has asked for a "decent wage" and a shorter week, and it seems clear there will be a decided shift therefore in working hours and weeks that will shorten the number of the former and

the days of the latter, meaning higher costs. No doubt exists also, it is said, that many industries will have to raise rates of pay. If prices are set up also it seems apparent there will have to be a yardstick set up to cover an average, based on costs, above that of some plants and below that of other plants. This necessarily would leave a greater margin of profit for the low cost plant than for the higher cost plant, which apparently the government will have to recognize. It has been suggested that the advantage may be absorbed through taxation, but this would kill initiative and reward inefficiency.

The higher costs that it is thought will come from price structures are said to be a part of the program of "reflation" as a means of increasing employment, raising purchasing power and stimulating industry, all looking toward economic recovery. But it is also realized that higher costs will spread even wider than at present the disadvantage to American producers in competing with foreign manufacturers.

This point also received the attention of Bernard Baruch. After cautioning industry against attempts at monopolistic combinations under the industrial control system, and favoritism among particular groups, and declaring that it is not intended to preserve unwise investments in uneconomic assets and that it must not be used to eliminate labor by closing down plants, Mr. Baruch said:

### Competition with Cheap Imports

"Finally this process is certain to raise American costs even further above world costs, and to require additional protection against importations. Coupled with the further effect of the Farm bill to raise prices, all this struggle suggests inconsistency in domestic policy with any plan to lower tariffs in world economic conferences. But that can be ironed out."

Mr. Baruch spoke of the plan as being an experiment "which is worth while making, but the most certain way to insure its failure is to attempt to use it for any other than the purpose for which it is intended."

He insisted that a competent Federal administration must be set up promptly when the Industrial act is passed and said the administration should be composed of "a practical and distinguished specialist for each principal industrial group."

Speaking for 56,000 manufacturers included in the membership of the Na-



tional Association of Manufacturers, of which he is president, Robert L. Lund said they approved the National Recovery bill entirely and expressed the conviction that industrial groups throughout the country will rapidly present plans to balance production and consumption; prevent under-wage payments; stabilize employment, and "stop the deadly downward spiral which has resulted in demoralizing dangerous competition."

#### Says Licensing Provisions Are Unconstitutional

Of first importance, he said, is the form of organization, personnel and regulations for the execution of the act. He declared that industry has every confidence that the President will draw upon men with experience in business and industrial affairs for the administration of the act.

The licensing provisions of the bill as now written, according to Mr. Lund, apparently are not constitutional. To support his statement he cited the Supreme Court decision in the case of the New State Ice Co. of Oklahoma by which the court invalidated the statute which required those desiring to engage in manufacturing to secure a license. He said, however, this licensing provision would probably be sustained by the courts if applied to natural resource industries only. Fortunately, he added, it is with respect to natural resource industries that the licensing provisions are most important.

"The effect of imports upon the operation of this bill," Mr. Lund said, "particularly those from low labor cost and depreciated currency countries, is of extreme importance since the effect would be to increase the price margin on such imports and unless restricted they might flood the market. The Manufacturers' Steering Committee is of the opinion that there must be control of such imports in order to enable successful operation of the plan."

Mr. Lund also suggested that the labor provisions of the bill as now drawn might destroy the welfare organizations for sickness insurance, group life insurance, and such things, now common in industry, and might further serve to force employers to deal with Communistic or racketeering organizations. Manufacturers are agreeable, he said, to a one-point manufacturers' tax to service public funds, if such funds must be used. The Steering Committee, however, he stated, prefers the turnover form of tax rather than the single point of tax. Whatever form of sales tax is adopted, it was declared, should displace the present special excise taxes.

Great Lakes Steel Corp., Ecorse, Detroit, division of National Steel Corp., same address, has approved plans for new slag plant to cost about \$100,000 with equipment, and will make improvement in other divisions to cost \$150,000 additional.

## PERSONALS

T. HOLLAND NELSON, consulting engineer, Widener Building, Philadelphia, has been retained as metallurgical adviser to the Globe Stainless Tube Co., Milwaukee.

♦ ♦ ♦

WILLIAM P. WITHEROW, formerly president of the former Witherow Steel Co., Pittsburgh, and more recently vice-president of the Republic Steel Corp., Youngstown, has been elected president of the Steel Products Co., McKees Rocks, Pa., distributor of iron and steel materials.

♦ ♦ ♦

R. J. MACFARLANE has been appointed general purchasing agent of General Motors of Canada, Oshawa, Ont. For the past three years he has been in the purchasing department and previously was with the Ford Motor Co. of Canada. WALLACE H. CLARK has been placed in charge of the assembly and sheet metal plants of General Motors of Canada at Oshawa, Ont. He had recently been attached to the staff of H. A. BROWN, vice-president and general manager.

♦ ♦ ♦

A. J. BOPP, president Bopp Steel Corp., was elected president of the Iron and Steel Club of Detroit at the annual meeting at the Detroit Athletic Club on May 18. CHARLES A. POXSON, Newton Steel Co., was named vice-president and W. J. CLUCAS, Columbia Steel Co., secretary.

♦ ♦ ♦

C. H. NEHLS has become associated with the Detroit Metal Specialties Corp., Detroit, as chief engineer. He formerly was connected with the Houdaille-Hershey Corp.

♦ ♦ ♦

JOHN G. WOOD has been appointed assistant chief engineer of the Chevrolet Motor Co., Detroit. He formerly was chief engineer of the Olds Motor Works, Lansing, Mich. He is being succeeded by C. L. MCCUEN as Olds chief engineer.

♦ ♦ ♦

ALFRED C. RANTSCH has been named engineer in charge of sales promotional work of the die-casting division of the AC Spark Plug Co., Flint, Mich. He has been connected with the die casting industry in production and sales capacities for 25 years.

♦ ♦ ♦

DR. FRANK N. SPENDER, metallurgical engineer, National Tube Co., Pittsburgh, will preside at an international conference on corrosion of iron and steel to be held by the Electrochemical Society at a meeting in Chicago, Sept. 7, 8 and 9.

♦ ♦ ♦

DR. A. B. KINZEL, chief metallurgist of the Carbide & Carbon Research Laboratory, has been elected

chairman of the New York chapter of the American Society for Steel Treating for 1933-1934. J. S. VANICK, research metallurgist of the International Nickel Co., has been elected vice-chairman, and T. N. HOLDEN, secretary-treasurer.

♦ ♦ ♦

MAX MELTZER, formerly Pittsburgh representative for the Joseph Schonthal Co., Columbus, Ohio, dealer in iron and steel scrap, has formed the Max Meltzer Co., 911 Clark Building, Pittsburgh, and will carry on a miscellaneous scrap business. He has had experience in the New York and Detroit territories, and was formerly identified with the Continental Iron & Steel Co., New York.

## OBITUARY

CHARLES KRISER, president and founder of the Industrial Plants Corp., New York, died at his home in Flushing, N. Y., after a long illness, on May 15. He was born in Hungary 52 years ago and came to the United States in 1900.

♦ ♦ ♦

J. W. BETTENDORF, president of the Bettendorf Co., Bettendorf, Iowa, railroad car and equipment maker, died at his home in that city on May 16. He was born in Leavenworth, Kan., on Oct. 10, 1864, and at the age of 18 entered a plow shop at Peru, Ill., as a machinist. He later became foreman of the shop's assembly plant. In 1886, in association with his brother, he established the Bettendorf Metal Wheel Co., which later entered the railroad equipment field as the Bettendorf Co. Mr. Bettendorf was made president of the company in 1910. He was one of the leading industrialists in Davenport, Iowa, and was identified with a number of companies, including the Westco Pump Co., Innes Mfg. Co., Davenport Machine & Foundry Co. and the Davenport Locomotive & Mfg. Co.

♦ ♦ ♦

FRANK V. SARGENT, former New England district manager of the Chicago Pneumatic Tool Co., died at his home in Watertown, Mass., on May 17. He was born in Belmont, Mass., in 1880.

♦ ♦ ♦

FRED J. HANSON, engineer in charge of experimental and research laboratories, Wisconsin Motor Co., Milwaukee, died May 12, aged 54 years. He was born in Milwaukee and became associated with the company in 1908, shortly after its establishment.

♦ ♦ ♦

JOHN A. UBSDELL, president and general manager, Great Lakes Engineering Works, Detroit, died on May 15 after an illness of several months. He was 66 years of age.

# Fabricated Structural Steel

## Lettings Higher—New Projects Also in Better Volume

**B**OOKINGS of 15,500 tons are the heaviest since early in April, with the exception of the first week in May when awards were made for the San Francisco-Oakland bridge. Almost one-half of the week's tonnage is for the Knickerbocker apartment building in New York for the Fred F. French company. New projects of 18,100 tons are swelled by 10,000 tons which will be required for an extension to the West Side elevated highway in New York, and 5000 tons for a court house and jail in Kansas City, Mo. Awards for the week follow:

### NORTH ATLANTIC STATES

New York, 7400 tons, Knickerbocker apartment building, for Fred F. French Investing Co., Inc., to Harris Structural Steel Co.

Jamaica, N. Y., 180 tons, Krug Baking Co., Inc., building, to Ingall Iron Works.

Elizabeth, N. J., 180 tons, Wilson-Jones building, to Breen Iron Works.

Salem, N. Y., 285 tons, grade crossing elimination for Delaware & Hudson Railroad, to McClintic-Marshall Corp.

Unadilla, N. Y., 215 tons, grade crossing elimination for Delaware & Hudson Railroad, to Lackawanna Steel Construction Corp.

Buffalo, 100 tons, Buffalo Pipe & Foundry Co., crane runway, to R. S. McMannus Steel Construction Co., Buffalo.

Buffalo, 260 tons, Norton Hall, University of Buffalo, to Ernst Iron Works, Buffalo.

Buffalo, 200 tons, second addition to Lang's Brewery, to R. S. McMannus Steel Construction Co.

### SOUTH AND SOUTHWEST

Louisville, Ky., 190 tons, building for Fall City Ice & Beverage Co., to McClintic-Marshall Corp.

Del Rio, Tex., 800 tons, highway bridge, to Virginia Bridge & Iron Co.

Myrtle, Ark., 900 tons, bridge for Missouri Pacific Railway, to Stupp Brothers Bridge & Iron Co.

West Memphis, Ark., 200 tons, seed house, to Muskogee Iron Works, Muskogee, Okla.

### CENTRAL STATES

Waterloo, Iowa, 160 tons, packing plant, to Pittsburgh-Des Moines Steel Co.

Decatur, Ill., 190 tons, bridge for Wabash Railway, to Mississippi Valley Structural Steel Co.

Sheboygan, Wis., 125 tons, court house, to Wisconsin Bridge & Iron Co., Milwaukee.

Seneca, Ill., 200 tons, Rock Island bridge, to American Bridge Co.

Warren and Jefferson Counties, Mo., 200 tons, bridges, to Stupp Brothers Bridge & Iron Co.

Cooper County, Mo., 250 tons, bridges to St. Louis Structural Steel Co.

Lincoln County, Mo., 500 tons, bridge, Route 47, section 32, to Midland Structural Steel Co.

### WESTERN STATES

Berkeley, Cal., 140 tons, Kress department store, to Judson-Pacific Co.

San Francisco, 1500 tons, jail, to Judson Pacific Co.

San Francisco, 984 tons, Bohemian Club, to Judson-Pacific Co.

San Francisco, 250 tons, Bayshore grandstand, to McClintic-Marshall Corp.

Los Angeles, 100 tons, distributing and substations, to an unnamed fabricator.

### NEW STRUCTURAL STEEL PROJECTS

#### NORTH ATLANTIC STATES

Providence, R. I., 400 tons, Providence Journal Co. building; James Stewart & Co., Inc., general contractor.

New York, 10,000 tons, extension of West Side elevated highway; bids about June 9.

Wolcott, N. Y., 500 tons, high school; bids early in June.

### CENTRAL STATES

Chicago, 500 tons, Roosevelt Road highway viaduct.

State of Illinois, 350 tons, highway bridges.

Milwaukee, 250 tons, Blatz Brewery.

Wabash Railway, 250 tons, bridges.

Jefferson City, Mo., 900 tons, including bridges at Kirksville, 600 tons, and Lebanon, 135 tons; bids opened May 19.

Kansas City, Mo., 2500 tons, regional bridge; Kansas City Bridge Co., Kansas City, Mo., and Wisconsin Bridge Co., Milwaukee, low bidders, respectively on two alternative proposals.

Kansas City, Mo., 5000 tons, court house and jail; bids to be opened June 6.

### WESTERN STATES

Union Pacific Railroad, 220 tons, bridge at Sand, Ore.

Seattle, 3561 tons, sheet piling for Railway Avenue seawall, tentative date for bids June 8.

Kern County, Cal., 100 tons, State highway undercrossing; bids May 31.

### FABRICATED PLATE

#### AWARDS

Milton, Mass., 100 tons, tanks, to Pittsburgh-Des Moines Steel Co.

New York, 500 tons, tanks for Jacob Rupert, to Pfaudler Co.

New York, 500 tons, repairs to oil tankers, to an unnamed fabricator.

Pittsburgh, 540 tons, three barges for Union Barge Line Co., to Dravo Contracting Co.

Milwaukee, 100 tons, Schlitz brewery, to an unnamed bidder.

### NEW PROJECTS

Washington, 3500 tons, four destroyers for United States Navy; bids to be taken about July 6.

Conneaut, Ohio, 200 tons, 500,000 gal. elevated water tank, Chicago Bridge & Iron Co. low bidder.

## A. I. S. E. E. Inspect New Sheet Mill

An inspection of a 4-high sheet mill, now being built by the E. W. Bliss Co., Salem, Ohio, for the American Sheet & Tin Plate Co., was conducted by the Association of Iron and Steel Electrical Engineers on May 20. The mill, which will probably be installed at the latter company's Gary, Ind., works, is one of the largest ever built, having backing rolls 56 in. in diameter and 84 in. long, and 20-in. working rolls of the same length. It is capable of rolling sheet steel in strip up to 72 in. in width. The housings of the mill are laminated forged steel, and the screw down is said to be the

most powerful ever built. Following the inspection at the plant, Lloyd Jones, general manager of the Bliss company's Salem plant, delivered a paper on "Cold Rolling Processes."

The United Engineering & Foundry Co., Pittsburgh, showed another mill of the same size at its Youngstown plant on May 22. This unit, which has also been built for the American Sheet & Tin Plate Co., is of the 4-high roller bearing type, with rolls of the same dimensions as that of the Bliss mill. A cast steel housing is used in the United mill which weighs 230,000 lb., and is probably the largest mill housing ever cast in one piece. Larger housings have been built for blooming mills, but are constructed of separate vertical and horizontal members held together by various joint fastenings. As the mill must roll cold strip steel under pressure up to 12,000 lb. between the rolls, the construction was of unusual interest. A more detailed description of the unit will appear in THE IRON AGE at an early date.

## Reinforcing Steel

### Awards 1300 Tons—New Projects, 4100 Tons

#### AWARDS

Sheboygan, Wis., 350 tons, court house, to Inland Steel Co.

Los Angeles County, Cal., 203 tons, San Gabriel Dam No. 2, to Pacific Coast Steel Corp.

Los Angeles, 200 tons, casket factory, to Soule Steel Co.

Los Angeles, 432 tons, for water and power department, to Pacific Coast Steel Corp.

Oakland, Cal., 100 tons, Ensign terminal, to Soule Steel Co.

### NEW REINFORCING BAR PROJECTS

Catskill, N. Y., 300 tons, bars for superstructure, and 1500 tons, miscellaneous steel for approaches, Rip Van Winkle bridge over Hudson River.

Providence, R. I., 300 tons, Providence Journal Co. building; James Stewart & Co., Inc., general contractor.

New York, 1000 tons, extension of West Side elevated highway; bids about June 9.

Coxsackie, N. Y., 200 tons, State vocational school.

Albion, N. Y., 100 tons, State institute for defective delinquent women; bids this week.

Cincinnati, 130 tons, bridge No. 11 for Chesapeake & Ohio Railroad.

Conneaut, Ohio, 135 tons, waterworks extension.

Chicago, 140 tons, pumping plant.

Seattle, 1678 tons, Railway Avenue seawall; tentative date for bids June 8.

Camarillo, Cal., 100 tons, units 1 and 5 of State hospital; bids under advisement.

Mercer Tube & Mfg. Co., Sharon, Pa., manufacturer of steel tubing, will be continued in operation by D. W. Naismith and D. V. Sawhill, receivers, recently appointed, who have secured permission from the court to make improvements in plant.



# British Steel Outlook Improves But Continental Remains Dull

**L**ONDON, ENGLAND, May 24 (*By Cable*).—The British steel outlook is improving while buying of Continental material is virtually stagnant. Structural and engineering steel gives evidence of better demand, while recent trade pacts especially with Norway and Sweden are expected to improve tinplate demand, which now reflects small volume but firm prices. These countries now have provided assurance of the maintenance of free entry of Welsh tinplate.

Cleveland pig iron is selling in moderate amounts to Scandinavia and Italy at prices below cost, but home prices are being maintained and stocks are small. Hematite supplies are excessive, rendering both home and export quotations uneconomic at present.

The International Cartel at the Paris meeting discussed principally the protection of national markets and the relationships between sales offices and exporters. It is expected that the fixing of prices and the final arrangements for putting the sales offices into operation will take place at the Liege meeting this week.

Continental steel business is dull, but prices are firm with a number of small advances in semi-finished and finished steel.

It is reported that the French Schneider Creuzot Co. has advanced Turkey 600,000,000 fr., partly for war and railway material in exchange for Turkish oil concessions.

## British Prices f.o.b. United Kingdom Ports

Per Gross Ton	
Ferromanganese, export .....	\$9
Billets, open-hearth \$5	to \$5 7s. 6d.
Black sheets, Japanese specifications .....	\$11
Tin plate, per base box .....	16s. 6d. to 17s.
Steel bars, open-hearth .....	\$7 17½s. to \$8 7½s.
Beams, open-hearth \$7 7½s.	to \$7 17½s.
Channels, open-hearth .....	\$7 12½s. to \$8 2½s.
Angles, open-hearth .....	\$7 7½s. to \$7 17½s.
Black sheets, No. 24 gage.....	\$8 10s.
Galvanized sheets, No. 24 gage....	\$10 10s. to \$10 15s.

## Continental Prices f.o.b. Continental Ports

Per Metric Ton, Gold £ at \$4.86	
Billets, Thomas... £2 8s.	to £2 9s.
Wire rods, No. 5 B.W.G. ....	\$4 10s.
Black sheets, No. 31 gage, Japanese .....	\$11 5s.
Steel bars, merchant .....	\$2 17s. 6d. to £3
Beams, Thomas... £2 13s.	6d.
Angles, Thomas 4-in. and larger	\$2 16s. 6d.
Angles, small....	\$2 18s. 6d.
Hoops and strip steel over 6-in. base .....	\$3 12s. 6d.
Wire, plain, No. 8	\$5 7s. 6d.
Wire nails.....	\$5 15s.
Wire, barbed, 4-pt. No. 10 B.W.G....	\$8 15s.

## Last Minute Sales Leads

(Received too late for classification  
in our Plant Expansion Section)

**United States Engineer Office**, First District, 333 North Michigan Avenue, Chicago, asks bids until June 15 for steam and compressed air plants for Dresden Island and Starved Rock, including air compressors, pumps, electric equipment, piping, etc.

**Washington Brewing Co.**, Washington, Pa., recently organized by Joseph Crockett, Fredericktown, Pa., and associates, has taken over local Crescent brewery and will remodel for new plant. Cost over \$100,000 with brew-house, bottling and other machinery.

**Gulf Refining Co.**, 17 Battery Place, New York, has plans for new bulk oil storage and distributing plant at Fort Pierce, Fla., work to begin early in June. Cost about \$60,000 with tanks and other equipment.

**American Consolidated Tin Mines Corp.**, 120 Liberty Street, New York, is considering early development of mining property near Lincolnton, N. C., with erection of mill unit with initial capacity of about 100 tons daily. Other units of similar size will be built later. Plans are being drawn by U. S. James, 35 Runyon Street, Newark, N. J., metallurgical engineer. J. H. Banks is consulting engineer.

**City Clerk, Carl Muench**, Mayville, Wis., asks bids until June 8 for four motor-driven pumping units with accessories, flight conveyor for tank unit, clarifier mechanism, sludge heating equipment, valves and other equipment for sewage disposal plant. W. G.

**Kirchoffer**, 22 North Carroll Street, Madison, Wis., is consulting engineer.

**Pacific Mills**, Lyman, S. C., have plans for addition to steam power plant at local cotton mills. Cost about \$100,000 with equipment. Company headquarters are at 140 Federal Street, Boston. Lockwood Greene Engineers, Inc., 24 Federal Street, Boston, is engineer.

**F. H. L. Products Co.**, 1800 East Forest Street, Detroit, plans four-story addition to brewery for bottling, mechanical-cooling and other service. Cost over \$85,000 with equipment. George Fuchs is company architect.

**Eldorado Brewing Co.**, 626 North American Street, Stockton, Cal., A. D. Rothenbush, head, plans new multi-story brewery. Cost about \$100,000 with equipment.

**Hydrogas Refining Co., Ltd.**, 25 King Street West, Toronto, is planning new oil refining unit at Kingston, Ont. Cost over \$85,000 with equipment.

**F. Rassman Mfg. Co.**, Beaver Dam, Wis., manufacturer of farm equipment and tools, has perfected a machine for harvesting sugar beets, and is engaging in quantity production.

**Vilter Mfg. Co.**, Milwaukee, has recalled most of its employees to handle extensive orders for ice and refrigeration machinery growing out of renewed brewery activity. Payroll now numbers 450.

**Manitowoc Products Co.**, 900 Marshall Street,

Manitowoc, Wis., will rehabilitate both Gutsch and Schreier breweries at cost of \$75,000. Work is in charge of Edward A. Juul, local architect. Daniel C. Bleser is president.

**Green Bay, Wis.**, Board of Public Works has been authorized to take bids at once for electrification of municipal waterworks plants. J. S. Hartt, 122 West Washington Avenue, Madison, Wis., is consulting engineer.

**Iron & Steel Products, Inc.**, Railway Exchange Building, Chicago, has purchased for dismantling detinning plant of Vulcan Detinning Co., Streator, Ill. Property covers 51½ acres.

## Offer Contract Clause to Cover N.Y. Tin Sales

The contract committee of the American Tin Trade Association recommended on May 18, in view of the New York State Retail Sales Tax, that all members of the Association should adopt and incorporate in their sales contracts the following clause:

"The buyer certifies that this tin is purchased for resale or as a constituent part of goods to be produced or manufactured for sale"

and that a similar form of certification should be submitted to all buyers to cover all shipments and/or deliveries made and/or to be made between May 1, 1933, and June 30, 1934, against all outstanding contracts which did not already carry such a certification clause, thus making the contract conform with the following provisions of the New York State Sales Tax Act:

"The burden of proving that a sale of tangible personal property was not a sale at retail shall be upon the person who made it, unless such person shall have taken from the purchaser a certificate signed by and bearing the name and address of the purchaser to the effect that the property was purchased for resale."

## Ohio and Allegheny River Shipments Increase

Movement of iron and steel products on the Ohio River in the Pittsburgh district during April amounted to 37,191 net tons, as compared with 32,917 tons in the preceding month, and 32,972 tons in April, 1932. According to the United States Engineer office, Pittsburgh, which compiles these figures, Monongahela River steel traffic in April totaled 35,795 tons, as compared with 19,546 tons in March, and with 23,849 tons in April of last year. Allegheny River steel shipments were 3025 tons in April, 425 tons in March, and 501 tons in April, 1932.

Rotary air compressors and vacuum pumps of the multi-cellular, sliding-vane type, made by the Allis-Chalmers Mfg. Co., Milwaukee, now cover a range of volumes from 50 to 2000 cu. ft. a min. The air-cooled units are suitable for pressures up to 10 lb. gage and vacuums up to 18 in. of mercury and the water-cooled units for higher pressures, say up to 150 lb. and higher vacuums.

# • • EDITORIAL COMMENT • •

## A Big Job Ahead . . .

**J**UST what the steel industry can, should or will do to provide self regulation in accordance with the industry control measure, cannot as yet be said. It will require careful thought, planning and the adoption of a more complete viewpoint of mutuality to outline, define and limit the scope of action which is of such vital import.

Yet action must be had. If it does not spring from within, it will be sprung from without. And that is not a pleasant eventuality for the industry to consider.

It is evident, fortunately, that the Administration does not expect industry control to emerge overnight, full grown, from the ashes of individualism. It is suggested that the job be done piecemeal, starting with wages and hours. The assumption is that if wage rate minimums and hours per week maximums are established, prices will take care of themselves and that price fixing and other regulations may be avoided.

We regretfully express our doubts. History has shown clearly that the price cutter has no respect for costs, whether they be his own or his competitors. Unless there be teeth provided to bite him when he does so, he will continue to sell below the cost indicated by whatever wage rates and working hours that may be fixed, in order to gain for himself the personal advantages of an increased share of business, in the hope that this larger volume will sufficiently reduce overhead to clear him.

As a result of this harmful policy, not only has every dollar of cost saving represented by depression wage cuts

been passed on to customers of the industry, but more too, so that the entire industry with but an occasional exception has been submerged for the past eighteen months in the sea of red ink.

Even so, wage rate cuts in the steel industry have undoubtedly averaged much less, during the depression, than in most other industries. Which is another indication that there is not the definite relationship between wages and prices that many suppose.

In the proposed general reorganization of industry, the consumer or fabricator of metals cannot establish his price levels until he knows what the materials entering his product are going to cost. As the principal supplier of metal-working materials, the steel industry is the base of the industrial price structure. It must therefore lead the procession. If we are going to get anywhere without long drawn-out confusion and delay we cannot divorce steel price fixing on the principal tonnage materials, from steel wage and working hour fixing. To do so would result in competitive price chaos more damaging than that which now exists.

We suggest that the simplest approach to steel industry control will be found in the establishment, under government approval, of an enforced price base for the more common products, established in accordance with a reasonable return to capital on the average cost of production, figuring labor cost on the basis of whatever wage level adjustments that the Administration considers to be indicated for labor as a whole.

## Monetary "Protection" And Business Recovery . . .

**E**VERYWHERE one hears talk of "inflation," as if inflation really were responsible for the recent pickup in business. Fear of inflation may have played a part in stimulating buying of commodities and securities, but inflation itself has not yet materialized. And inflation in the form of large emissions of unsupported currency may never come to pass. Obviously risky experiments of that sort will not be tried except as a last resort.

Meanwhile business improvement is gathering momentum and in retrospect one wonders whether the turn for the better came because we feared inflation or because we were freed from the fear of further deflation. Nothing seems so clear now as the timeliness and effectiveness of the embargo on gold exports. By putting a stop to foreign withdrawals of gold our Government removed the greatest single cause of monetary and banking instability. So long as our banking system had to be prepared to disgorge large quantities of gold upon demand, it was forced to keep itself in a state of maximum liquidity. Its entire policy was necessarily defensive. It could not build up a credit structure on reserves that were subject to sudden reduction.

The deflationary effect of foreign withdrawals was, of course, aggravated by domestic hoarding. But this too has been brought to a halt by Governmental action.

With our gold reserves made secure, we now have a stable foundation upon which to build a price structure. Waves of liquidation, caused by repeated foreign and domestic drafts on our gold reserves, can no longer undermine values.

To be sure, this security has been won by sacrificing the stability of the dollar in international marts. But economic recovery must start somewhere; it is not likely to get under way simultaneously throughout the world. And monetary "protection," for a time at least, may be necessary to permit this country to get back on its feet. Certainly business improvement has been mainly of an internal character. The impressive rise in automobile production, the large use of tin plate by the canning industry, and the expansion of activity among miscellaneous industries, all reflect a recovery of domestic consumption, finally released from the bondage of fear.

Long accumulated needs now promise to translate themselves into purchases as rapidly as expanding employment creates work-generating demands. The American people have denied themselves of much in the past three years and they are psychologically ready for an about-face. Given continued protection from deflation, they may release such a large volume of pent-up demands as to make further consideration of such artificial stimulants as "planned production" and large scale public works unnecessary.



# Highway Construction Will Be Major Public Works Item

WASHINGTON, May 23.—Director of the Budget Lewis, testifying before the House Committee on Ways and Means, said that the public works program actually calls for an expenditure of \$3,400,000,000, of which about \$2,000,000,000 will be spent on state, municipal and other local government projects; \$400,000,000 on highway construction and \$1,-

000,000,000 on federal buildings, naval construction, flood control, rivers and harbors and other projects. It is certain that post offices and public buildings will be a minor part of the public works program.

By far the largest single item will be highway construction. This will call for large tonnages of reinforcing

bars, while some of the other projects will call for large tonnages of structural and other kinds of steel. Metal-working machinery, equipment for river and harbor work, which over the past decade has represented an annual expenditure of \$30,000,000; trucks, flood control devices and other kinds of equipment will be used in large quantities. Grade crossing elimination also will be undertaken on an extensive scale, it is said, and will mean steel tonnages in sizable quantities. Widening of bridges and new bridges over federal highways, culverts and other work will create steel demand.

## "Planned Industry Holds Promise," Says George M. Verity

FAITH in the future of planned industrial and business activities was expressed by George M. Verity, chairman, American Rolling Mill Co. at the annual stockholders' meeting of that company on May 18.

"While many of the major problems involved in the periods of business depression are much the same in cause and effect," said Mr. Verity, "the setting is always sufficiently different to make us feel that 'a current situation' is always the worst.

"Public consciousness covering any one or more phases or theories of life, of business or of government, even though we may be individually unconscious of its existence, determines public policy to such an extent that not even the most selfish men in public life can resist it. When their public, the group to which they must look for reelection, reaches a definite conclusion they must go along with it.

"In our National financial structure where a few outstanding leaders have failed in their trusteeship many thousands of others have proved themselves men of honor, of capacity and of ability in their respective fields of effort. If it were not so, 80 per cent of our banking structure could not have been approved by our government and made immediately available to the needs of business in a crisis of such proportions that it demanded the temporary closing of them all.

"There have been comparatively few breakdowns in large industrial trusteeships, but these few have been so monumental and the effect of their operations so widespread that it has given license to the radical politician and the uninformed critic to charge all management with somewhat similar policies and practices in a greater or less degree.

"To argue, however, that there is not need for great improvement, reform, strengthening and rebuilding in our whole business and social structure, after its rapid and spectacular growth, would prove us incapable of profiting by our costly experiences.

"We may have to change many of our established conceptions of policy and program affecting our whole task of living and working together. Business adventure of every sort must come to learn that individualistic selfish planning can only end in defeat and disaster, that the ultimate success of every soundly organized and properly managed business lies in the progress of all.

"In the great forward movement of the Nation, commerce and industry grew to gigantic proportions, in spite of a system of enforced destructive competition, which if not changed or checked would sow the seeds of an ultimate decline in its constructive power.

"If, through all this crucial travail, industry is now going to be permitted to intelligently plan its own progress under a governmental supervision, which will not be dictation or domination but which represents a new sort of helpful partnership between Government and business, which will encourage and not throttle its initiative, and which will not destroy its productive power, better days are surely ahead and the seeming losses of the past can prove to be our most permanent investment.

"Mighty forces of Government and of business are unquestionably at work to move commerce and industry in the right direction and we have great hope of and confidence in the future."

## Drop Forging Industry's Overcapacity

(Concluded from page 820)

sinkers, drop forgers, and other skilled men, could be concentrated for greater efficiency.

If provision is made for increase in specialization and for the retention of plants which are in strategical locations, both from the standpoint of raw material and of distribution, it would

be certain that such combinations could earn a profit and serve their customers as they should.

This plan is not as difficult as it sounds, because there are practically no areas where there is only one forge shop. This could be accomplished in some cities by moving the equipment less than ten miles.

The commercial forging industry has rightfully been viewed with apprehension by bankers and investors for some time in the past, and it is certain that with present conditions continuing, their fears will not be allayed. In recent years bank credit has been generous, but we have no assurance, whatsoever, that this complacent attitude toward a business with a year or two of meager profits in peak years but with continuing losses even in normal years is going to continue indefinitely. As exceptions to this general condition, there are certain specialized commercial forging companies that have shown consistent earnings, and will continue to do so during years of subnormal volume and reduced factory activity.

It is certain that bankers would regard with great favor the possibility of combining two financially sick corporations—due solely to lack of possible volume—into one which would be strong, having the volume of two old companies, but with the equipment and personnel of one.

A program of this type is recommended to the bankers. In the past, the bankers have often inadvertently contributed in no small measure to our difficulties in the industry, by continuing to refinance shops that had no excuse for existence. No banker should finance a drop forge proposition unless he feels assured that there is a suitable volume of profitable business available. This volume can probably, in most instances be obtained only by combinations.

From the bankers' point of view, the only stumbling block in this program, which is economically sound, is the petty jealousies between the executives of the commercial forge companies. Let the executives of the commercial forge shops demonstrate that they are really qualified for their position and proceed with a constructive program for the industry.

## SUMMARY OF THE WEEK'S BUSINESS

# Renewed Buying Drives Steel Output to Highest Rate in Two Years

Spurt in Tin Plate Releases and Widening of Demand from Other Sources Are Features—Advances in Flat Rolled Steel and Pig Iron

**R**ENEWED confidence in the persistence of recent improvement in the iron and steel market characterizes the attitude of both buyers and sellers. Such hesitancy as was caused by the recent pause in steel demand or by the reaction in scrap has been dispelled by increased buoyancy in the automobile industry, a new spurt in tin plate business, a steady broadening of miscellaneous steel buying and further price advances on both finished steel and pig iron.

Buyers are offering less and less resistance to prices, evidently being impressed both by the earnestness of sellers and the possibility of subsequent stabilization at still higher levels under Government auspices.

Steel production, under the stimulus of reaccelerated bookings, has again increased in most districts. Ingot output has risen from 23 to 25 per cent at Pittsburgh, from 33 to 37 per cent at Chicago, from 41 to 44 per cent at Cleveland, from 38 to 42 per cent at Birmingham and from 75 to 80 per cent in the Wheeling district. The national average has advanced from 35 per cent a week ago to 38 per cent of capacity, the highest rate since June, 1931.

**T**HE widely held expectation of the industry that it would soon lose some of the support received from the motor car makers as summer approached is not being fulfilled. Retail demand for automobiles is gaining rather than losing momentum and total sales for May will surpass those of April by a wide margin. Motor car builders have accordingly revised their production schedules upward and it now seems likely that May assemblies will exceed 200,000 units. Steel releases by leading automobile makers indicate that little change in operating rates is contemplated for June. At least a mild recession in activities is still regarded as a possibility for July, although this opinion is subject to modification according to the course of retail sales.

Tin plate demand has been swelled by sharply increased specifications from the pineapple canning industry in Hawaii. The pineapple pack is now expected to be fully one-third larger than last year, possibly amounting to 8,000,000 cases. Tin plate output has risen above 80 per cent of capacity.

**F**ABRICATED structural steel lettings, at 15,500 tons, are the heaviest since early in April, with the exception of the first week of May when awards were made for the San Francisco-Oakland bridge. New projects of 18,100 tons include 10,000 tons for an extension of the West Side elevated highway in New York and 5000 tons for a court house and jail

in Kansas City. Plate fabricators continue to book sizable tonnages for brewing tanks, the outstanding award of the week being 1000 tons for the Schlitz brewery at Milwaukee. Two thousand tons of plates, as well as 900 tons of shapes and 200 tons of steel bars, will be required for four destroyers for which the Navy Department will open bids on July 6.

Reinforcing bar demand from distributors has been stimulated by a \$4 a ton advance in mill prices, and standard pipe specifications from jobbers have improved. The Pennsylvania Railroad will receive tenders May 26 on 5000 tons of structural shapes, 1400 tons of plates, 500 tons of reinforcing bars and 250 tons of sheet piling for piers at Baltimore. The Nickel Plate plans to scrap 6000 cars, joining the ranks of other roads that have undertaken the demolition of old rolling stock. No new equipment purchases of consequence are expected, however, until the Government's plan for railroad coordination is perfected.

**F**INISHED steel bookings at Chicago were the heaviest in seventeen months. While growing consumption accounts in large part for the widespread gain in demand, consumers generally are closely following the price situation. Considerable tonnage for June shipment will probably be brought out for products on which price advances for third quarter are definitely established.

The feature of price developments is the announcement of third quarter prices on the heavy tonnage sheet mill products, which are \$3 a ton over recent asking prices. Hot-rolled strip has been marked up \$1 a ton to 1.60c., Pittsburgh, and cold-rolled strip \$2 a ton to 2c., Pittsburgh or Cleveland. Wire mesh has been advanced \$4 a ton.

**P**IG IRON in eastern Pennsylvania has advanced for the third time since April 1, going up \$1 a ton. A 75c. a ton increase in Southern iron prices has occurred at Cincinnati. Buying is in good volume. At Chicago shipments are running double those of April.

Scrap has weakened at Detroit and Pittsburgh but has advanced at Birmingham and St. Louis. **THE IRON AGE** composite price for heavy melting steel has declined from \$9.83, a week ago, to \$9.66 a gross ton. **THE IRON AGE** composite for finished steel has advanced from 1.867c. to 1.892c. a lb., while the pig iron average has risen from \$14.41 to \$14.56 a gross ton.

Iron and steel exports in April, at 100,395 tons, were the largest since April, 1931. Scrap accounted for 73 per cent of the month's movement. Imports rose to 28,061 tons from 22,114 tons in March.



# ▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month and One Year Previous  
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron	May 23, 1933	May 16, 1933	Apr. 25, 1933	May 24, 1932
Per Gross Ton:				
No. 2 fdy., Philadelphia.....	<b>\$16.34</b>	\$15.34	\$14.34	\$14.84
No. 2, Valley furnace.....	14.50	14.50	14.50	14.50
No. 2 Southern, Cin'ti.....	15.82	15.82	15.82	13.82
No. 2, Birmingham.....	12.00	12.00	12.00	11.00
No. 2 foundry, Chicago*.....	16.00	16.00	15.50	16.00
Basic, del'd eastern Pa.....	<b>16.00</b>	15.09	14.09	16.00
Basic, Valley furnace.....	14.00	14.00	13.50	14.00
Valley Bessemer, del'd P'gh..	16.89	16.89	16.89	16.89
Malleable, Chicago*.....	16.00	16.00	15.50	16.00
Malleable, Valley.....	14.50	14.50	14.50	15.00
L. S. charcoal, Chicago.....	23.17	23.17	23.17	23.17
Ferromanganese, seab'd carlots .....	68.00	68.00	68.00	75.00

\*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Finished Steel	May 23, 1933	May 16, 1933	Apr. 25, 1933	May 24, 1932
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh.....	<b>2.10</b>	2.00	2.00	2.20
Hot-rolled annealed sheets, No. 24, Chicago dist. mill..	<b>2.20</b>	2.10	2.10	2.30
Sheets, galv., No. 24, P'gh....	2.70	2.70	2.70	2.85
Sheets, galv., No. 24, Chicago dist. mill.....	2.80	2.80	2.80	2.95
Hot-rolled sheets, No. 10, P'gh	<b>1.50</b>	1.40	1.40	1.55
Hot-rolled sheets, No. 10, Chicago dist. mill.....	<b>1.60</b>	1.50	1.50	1.65
Wire nails, Pittsburgh.....	1.85	1.85	1.85	1.95
Wire nails, Chicago dist. mill.	1.90	1.90	1.90	2.00
Plain wire, Pittsburgh.....	2.10	2.10	2.10	2.20
Plain wire, Chicago dist. mill.	2.15	2.15	2.15	2.25
Barbed wire, galv., P'gh.....	2.35	2.35	2.35	2.60
Barbed wire, galv., Chicago dist. mill.....	2.40	2.40	2.40	2.65
Tin plate, 100 lb. box, P'gh...	\$4.25	\$4.25	\$4.25	\$4.75

## Rails, Billets, etc.

Per Gross Ton:				
Rails, heavy, at mill.....	\$40.00	\$40.00	\$40.00	\$43.00
Light rails at mill.....	30.00	30.00	30.00	34.00
Rerolling billets, Pittsburgh..	26.00	26.00	26.00	27.00
Sheet bars, Pittsburgh.....	26.00	26.00	26.00	26.00
Slabs, Pittsburgh.....	26.00	26.00	26.00	27.00
Forging billets, Pittsburgh...	31.00	31.00	31.00	33.00
Wire rods, Pittsburgh.....	35.00	35.00	35.00	37.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb...	1.60	1.60	1.60	1.60

## Old Material

Per Gross Ton:				
Heavy melting steel, P'gh...	<b>\$11.50</b>	\$11.75	\$10.50	\$9.50
Heavy melting steel, Phila...	9.00	9.25	8.25	6.50
Heavy melting steel, Ch'go...	8.50	8.50	7.75	6.25
Carwheels, Chicago.....	9.50	9.50	8.25	6.25
Carwheels, Philadelphia.....	9.75	9.75	9.00	9.00
No. 1 cast, Pittsburgh.....	10.50	10.50	9.50	9.25
No. 1 cast, Philadelphia.....	10.25	10.25	8.00	8.00
No. 1 cast, Ch'go (net ton)...	8.75	8.75	8.00	6.50
No. 1 RR. wrot., Phila.....	10.75	10.75	8.00	8.50
No. 1 RR. wrot., Ch'go (net).	6.50	6.50	6.00	4.25

## Finished Steel

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.60	1.60	1.60	1.60
Bars, Chicago.....	1.70	1.70	1.70	1.70
Bars, Cleveland.....	1.65	1.65	1.65	1.65
Bars, New York.....	1.95	1.95	1.95	1.95
Tank plates, Pittsburgh.....	1.50	1.50	1.50	1.60
Tank plates, Chicago.....	1.70	1.70	1.70	1.70
Tank plates, New York.....	1.598	1.598	1.598	1.898
Structural shapes, Pittsburgh.	1.60	1.60	1.60	1.60
Structural shapes, Chicago...	1.70	1.70	1.70	1.70
Structural shapes, New York.	1.86775	1.86775	1.86775	1.86775
Cold-finished bars, Pittsburgh	1.70	1.70	1.70	1.70
Hot-rolled strips, Pittsburgh.	<b>1.55</b>	1.45	1.45	1.40
Cold-rolled strips, Pittsburgh.	<b>2.00</b>	1.80	1.80	2.00

## Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt.....	\$1.75	\$1.75	\$1.75	\$2.25
Foundry coke, prompt.....	2.50	2.50	2.50	3.00

## Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, refinery..	6.75	6.75	6.00	5.00
Lake copper, New York.....	7.00	7.00	6.25	5.50
Tin (Straits), New York.....	<b>36.00</b>	35.87½	30.25	21.10
Zinc, East St. Louis.....	<b>3.77½</b>	3.70	3.70	2.60
Zinc, New York.....	<b>4.14½</b>	4.07	4.07	2.97
Lead, St. Louis.....	3.52½	3.52½	3.37½	2.90
Lead, New York.....	3.65	3.65	3.50	3.00
Antimony (Asiatic), N. Y....	6.25	6.25	6.12½	5.12½

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

# ▲▲▲ The Iron Age Composite Prices ▲▲▲

## Finished Steel

May 23, 1933	1.892c. a Lb.
One week ago	1.867c.
One month ago	1.867c.
One year ago	1.970c.

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot rolled strip. These products make 85 per cent of the United States output.

	High	Low
1933 .....	1.948c., Jan. 3;	1.867c., Apr. 18
1932 .....	1.977c., Oct. 4;	1.926c., Feb. 2
1931 .....	2.037c., Jan. 13;	1.945c., Dec. 29
1930 .....	2.273c., Jan. 7;	2.018c., Dec. 9
1929 .....	2.317c., April 2;	2.273c., Oct. 29
1928 .....	2.286c., Dec. 11;	2.217c., July 17
1927 .....	2.402c., Jan. 4;	2.212c., Nov. 1

## Pig Iron

\$14.56 a Gross Ton
14.41
14.01
14.06

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	High	Low
\$14.56, May 23;	\$13.56, Jan. 3	
14.81, Jan. 5;	13.56, Dec. 6	
15.90, Jan. 6;	14.79, Dec. 15	
18.21, Jan. 7;	15.90, Dec. 16	
18.71, May 14;	18.21, Dec. 17	
18.59, Nov. 27;	17.04, July 24	
19.71, Jan. 4;	17.54, Nov. 1	

## Steel Scrap

\$9.67 a Gross Ton
9.83
8.83
7.41

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	High	Low
\$9.83, May 9;	\$6.75, Jan. 3	
8.50, Jan. 12;	6.42, July 5	
11.33, Jan. 6;	8.50, Dec. 29	
15.00, Feb. 18;	11.25, Dec. 9	
17.58, Jan. 29;	14.08, Dec. 3	
16.50, Dec. 31;	13.08, July 2	
15.25, Jan. 11;	13.08, Nov. 22	

# Ingot Rate in Pittsburgh Area Rises to 25 Per Cent of Capacity

## Tin Plate Output Now at 80 Per Cent—Further Price Advances on Flat Rolled Products—Scrap is Weaker

PITTSBURGH, May 23.—With the support of a sharp rise in tin plate production and resumption of the local rail mill, the local steel industry has been able to show further gains in the past week. Current releases on other finished products have shown no further expansion, but are easily holding at recent levels. Reinforcing bars and wire mesh are moving in slightly better volume, but structural steel demand is still light. Merchant bars are comparatively active and are moving into widely diversified channels.

Steel ingot production in the district has risen to 25 per cent of capacity, with the promise of further gains if plans to divert excess tonnage from other districts are carried out. A steel works blast furnace has resumed production, and a large Bessemer unit may resume to supply the demands of the tin plate industry. The smaller independent companies are holding production at recent levels.

Output in the Valleys and nearby northern Ohio plants has risen above 40 per cent of capacity, and may register further gains before the end of the week. The Wheeling district is running at 80 per cent, and a large blast furnace has been lighted.

Finishing mill production has been featured by a sharp rise in tin plate output, with mills in the industry as a whole now engaged at higher than 80 per cent of capacity. Sheet production is easily holding its own, and there have been no changes in other departments.

Further price advances in sheets have been announced, to be effective in the third quarter, and hot and cold-rolled strip steel have been marked up effective immediately. Reinforcing bars have been advanced \$4 a ton by distributors, and prices on wire mesh have been raised a similar amount. Advances on bars, plates and shapes may be deferred until next week, although an increase is practically assured for the third quarter. Higher pig iron prices have resulted in few sales at the advanced levels, and scrap has developed further weakness.

### Pig Iron

A few small tonnages of foundry, malleable and Bessemer iron have been sold in the Pittsburgh and Valley districts during the last week at the recently announced advanced prices. The A. M. Byers Co. has also closed against its inquiry for a large tonnage of Bessemer iron, the business going to a local furnace. Pig iron shipments are improving slightly, but foundry

schedules are not sufficient to warrant the movement of heavy tonnages. Roll makers are rather busy, and ingot mold foundries have increased their production considerably.

### Semi-Finished Steel

Increased prices for sheets and strip steel have forecast an advance in billets, slabs and sheet bars for third quarter. However, no announcement has been made, and the \$26, Pittsburgh or Youngstown, price is holding. Forging billets are in better demand, with the price firm at \$31, Pittsburgh. Wire rods continue relatively quiet.

### Rails and Track Accessories

Operation of the local rail mill this week has given the market an improved outlook, although scarcely any additional tonnage is definitely in sight. Releases of track accessories are a little heavier than they were last month, but no large tonnages are reaching producers.

### Bars, Plates and Shapes

Announcement of the Federal Government's construction program has given the structural steel market a more cheerful outlook, although the current situation shows little change. Both awards and new inquiries are small, although private projects are more numerous. Demand for reinforcing bars is beginning to expand, but is still far below seasonal expectations. Movement of steel plate for fabricating purposes has shown no further increase, although a local barge line has placed three barges, requiring 540 tons of plates, with a nearby builder. Many other barge building projects are under consideration, but definite inquiry is lacking, except in a few instances. Merchant steel bars continue to make the best showing of the heavy hot-rolled products. Demand is well distributed, and production ranges from 25 to 30 per cent of capacity. Alloy steel bars are also going to the automotive industry in good volume.

An advance of \$4 a ton in reinforcing bar quotations by distributors which was forecast last week has been put into effect, and this product is now quoted at 1.60c. at all basing points for mill lengths, and 1.75c. for cut lengths in lots of five tons or more. Corresponding advances in mill prices to distributors have been made. Merchant bars are well maintained at 1.60c., Pittsburgh, with an advance generally expected for the third quarter. Structural shape prices are well

maintained, and weakness in plate quotations seems to be disappearing.

### Cold-Finished Steel Bars

Well sustained demand from the automotive industry, as well as from warehouses, is maintaining specifications for cold-finished steel bars and shafting. Shipments this month have shown a satisfactory increase over April. The base price of 1.70c., Pittsburgh, is generally being adhered to, and an advance in quotations on hot-rolled bars would be reflected immediately by the cold-finishing industry.

### Tubular Goods

The pipe market is still comparatively dull, although practically all makers report increasing demand for standard butt-weld material. Oil country goods are very quiet, but the promise of stabilization in that industry has given the market a brighter outlook. No important line pipe projects are before the trade, but a few are said to be under consideration. Mechanical tubing is moving fairly well, but boiler tubes are rather quiet.

### Wire Products

Leading producers of wire products have discontinued the practice of making quarterly contracts, and have announced that business now on their books must be specified against by June 30 for shipment prior to July 15. No change in prices has been made, although the industry will now be in a position to change quotations from month to month if the occasion arises. Future orders booked during a current month will have to be taken out by the middle of the following month. This new policy ends a long established custom in the wire industry, particularly where merchant products are concerned. Demand has not changed materially, but the termination of contracts will likely boost specifications next month. Wire mesh has been advanced \$4 a ton by leading producers, and is moving in slightly better volume.

### Sheets

Announcement of third quarter prices on the heavy tonnage sheet mill products, which are \$3 a ton over recent asking prices, was the feature of this market last week. At the same time the auto body and steel furniture sheet classification was reinstated, while cold-rolled sheets will be sold on a mill run basis. Hot-rolled sheets, No. 10 gage, are being quoted for third quarter at 1.55c., Pittsburgh; hot-rolled annealed No. 24 gage at 2.25c.; heavy cold-rolled, run of mill, at 1.95c. for No. 10 gage; light cold-rolled, run of mill, at 2.40c. for No. 20 gage; while auto body and furniture stock is quoted at \$4 a ton over the cold-rolled basis. The extra for pickling has been advanced from 25c. to 35c. for 17 gage and lighter. Extras for drawing quality range from 15c. on 12 gage and heavier to 35c. on 23 gage and lighter, with 13 to 22 gage material taking 25c. All sheets in-



spected for purchase for outside exposed parts come under the classification of auto body and furniture sheets. While the new quotations are expected to apply throughout the third quarter, mills may reserve the right to withdraw contracts in the case of unusual advances in costs, particularly for labor. Vitreous enameling stock and tin mill black plate are unchanged, although long ternes are advanced to 2.90c.

These increases, which bring the third quarter asking prices on sheets to levels \$5 to \$7 a ton over those against which current shipments are being made, are expected to bring in considerable tonnage before the end of the quarter. Recent specifications have just about been holding their own, and mill operations continue at approximately 35 per cent of capacity. Full finishing units are engaged at a much higher rate, but jobbing mills are very quiet.

#### Tin Plate

Heavy demand from the pineapple canning industry in Hawaii has resulted in sharply increased specifications for tin plate during the last week. The pineapple pack is now expected to be fully one-third larger than last year, possibly amounting to 8,000,000 cases. Most of the larger interests have shared in this business, which was all for rush delivery, and mill operations have risen above 80 per cent of capacity. The leading interest is engaged at about 80 per cent, and has placed all but one or two of its plants in operation. A number of independents are running at capacity, with 18-turn weeks in prospect.

#### Strip Steel

Prices of both hot and cold-rolled strip steel have been advanced \$1 and \$2 a ton, effective immediately, with hot-rolled now quoted at 1.60c., Pittsburgh, and cold-rolled at 2c., Pittsburgh or Cleveland. Lower quotations have been withdrawn, and some makers are not quoting the higher level farther ahead than June. Demand is well sustained, and cold-rolled strip is slightly more active. Operations continue at about 35 per cent of capacity.

#### Coal and Coke

This market continues quiet, with prices generally weak. A New York State furnace has been inquiring for its requirements, preparatory to resumption of production in July. A few foundries are busier, but the majority have not increased their coke shipments. Activity in the coal market is confined principally to inquiries for forward requirements against which producers are not anxious to quote. Steel company mines are rather busy, but industrial and railroad requirements have not improved as much as expected.

#### Scrap

Although small tonnages of both No. 1 heavy melting steel and hy-

draulic compressed sheets have been purchased in the last week at \$12, the market is still rather weak and dealers are able to cover old steel contracts at as little as \$11. Buying prices range up to \$11.50 at some points. Overshipments are being received at a few plants resulting in distress prices. Blast furnace scrap is also definitely weaker, as there are only one or two outlets in the district. Machine shop turnings, however, continue strong, with \$8.50 still being paid by a dealer for one point. No changes have been recorded in the other grades, but gradually increasing open-hearth melt in this and nearby districts would seem to preclude much of a further decline. Prices in the Valleys, where open-hearth activity is higher, are definitely stronger than at Pittsburgh.

### Scrap Declines in Detroit Market

DETROIT, May 23.—Scrap prices turned downward the past week, with losses of 25c. to 75c. a ton in many items, especially steel grades. Heavy melting steel led the decline with a drop of 75c. A more plentiful supply of scrap and less eagerness on the part of dealers to contract for material until the further course of steel operations is more clearly defined were the main factors responsible for the market's weakness.

### Dam and Seawall Figured on Coast

SAN FRANCISCO, May 22.—With the increase in building activity during the last few weeks, steel prices have tended to become firmer. Structural steel is holding strong at 2.10c. and another increase in sheets is expected. However, reinforcing bars and particularly plates, in attractive tonnages, are weak. The week saw a pick-up in the jobbers' sales out of stock. The feeling prevails among the trade that the spring seasonal increase, which failed to materialize, is starting to be felt at this time and that activity will continue to gain during the next 60 days. The optimistic tone is based on increased employment, retail sales, general building and rising prices. In California it is reported that the smaller communities are leading the metropolitan areas in the recovery swing.

During the week awards were reported for 1623 tons of structural steel and 1026 tons of reinforcing bars. New inquiries were limited to 3700 tons of shapes and 1824 tons of bars. Primary among the new developments was the announcement at Seattle that construction of the Railway Avenue seawall would be paid for in cash and that June 8 is the tentative date for opening of bids. This construction calls for 3561 tons

of sheet piling, 1678 tons of reinforcing bars and 770 tons of cast iron. June 1 has been set for the opening of bids at Los Angeles for approximately 4125 tons of plates for Bouquet Canyon Dam. At Pearl Harbor, T. H., the award of the contract for the pier and quay walls has been indefinitely postponed.

### Pig Iron Demand Active at Buffalo

BUFFALO, May 23.—Pig iron sales continue good, with 10,000 to 12,000 tons booked here last week. One inquiry for 500 tons of foundry and several for 200 and 300 tons are noted. Buffalo prices are stiffening in the East, with the \$14 minimum beginning to fade and the \$15 minimum becoming more general. Producers are declining to quote for later than October 1. Considerable interest is apparent from melters who are not naming any definite tonnage.

#### Steel

Mill operations are being maintained, with the Lackawanna plant of Bethlehem running nine open-hearths, Republic Steel Corp. four and Wickwire-Spencer one. The Seneca sheet division of Bethlehem is operating at 30 per cent of capacity. A Buffalo maker will fabricate 100 tons of structural steel for a crane runway for the Buffalo Pipe & Foundry Co., and another has the contract for 200 tons for Norton Hall, new University of Buffalo building. Several sizable structural and reinforcing bar jobs have not been awarded yet. Wire business has improved.

#### Scrap

The market continues strong, with dealers reluctant to sell at present quotations. One large mill whose purchase of 2500 tons was noted last week has probably accumulated 2500 tons additional but is finding difficulty in obtaining more at the \$10 price. Dealers expect more purchasing and a higher price soon, as operations are keeping up and available scrap is being closely held. Reports are current of a tonnage sold this week at a higher price than \$10, but these cannot be confirmed. Sales of low phosphorus at \$12.50, including one lot of 2000 tons, have been made. No. 1 machinery cast has sold for \$11.00.

### Railroad Equipment

United Fruit Co. is seeking bids on two 2-8-2 type locomotives.

Campanhia Nacional de Cimento Portland, Brazil, has placed order for two 0-40 type meter-gauge locomotives with American Locomotive Co.

United States Navy Department has awarded contract to Koppel Industrial Car & Equipment Co. for three 80-ton box cars and five narrow-gauge flat cars.

# Chicago Steel Sales Heaviest in Seventeen Months

**Demand Becomes More Diversified, Pushing Production to a New High of 37 Per Cent of Capacity**

**C**HICAGO, May 23.—Sales of finished steel are not only the best of the year but they are larger than those of any week in 1932. Specifications are also the heaviest of the year and it is necessary to go back to March of last year to find a better week. Mill rolling schedules are reacting to this situation and ingot output has jumped four points to 37 per cent of capacity.

Structural awards show marked improvement and farm implement manufacturers are taking more steel. Miscellaneous and small railroad business is moderately better, and several railroad bridges swell the structural list. Plate and tank shops are showing more life, some of them now being in the market for the first time in over a year.

Price structures are working up and they stand on better ground than at any time in over a year. Sheet prices have been again advanced and wire products will no doubt follow the same course. Third quarter hot-rolled strip prices have been announced, and dealers are actively buying scrap in anticipation of a higher market.

Some steel company sales managers are giving consideration to the adoption of 30-day options instead of the usual quarterly contracts. They point out that commitments for three months are usually not binding except as to price and that the option plan is fair to producer and buyer alike in either a rising or a falling market.

## Pig Iron

Purchases of Northern iron remain in fair volume and there is a substantial amount of fresh inquiry. Shipments continue to grow and all indications are that the May movement will be well over double that of April. Books are now heavier than at any time in over a year and furnace stocks are steadily being depleted, though grades are still fairly well balanced. Prices are strong.

## Reinforcing Bars

Mills have advanced prices to warehouses, and dealers are in turn raising their quotations. Billet bars are now priced at 1.75c. a lb. for lots of 5 tons or over, and at 1.90c. for under 5 tons. The corresponding quotations for rail steel bars are 1.65c. and 1.50c. a lb. These prices take effect at once, but outstanding quotations will not be withdrawn until June 1. Road programs are moving slowly. Work in Illinois is still at a standstill and 1000 tons of Indiana work is delayed while bonding companies are being investigated.

## Warehouse Business

Effective at once Chicago warehouses are inaugurating new quantity differentials. These will result in substantial savings to the buyer who groups his orders to make up the total weight applicable to the quantity differentials. The commodities which may be combined are bars, bar-size shapes, bands, hoops, plates, Firm-tread and Inland floor plates, structural shapes and blue annealed sheets. Quantity differentials are as follows: 399 lb. and under, 50c. per 100 lb. advance over base; 400 to 999 lb., base price; 1000 to 4999 lb., 20c. per 100 lb. reduction from base; 5000 to 9999 lb., 40c. per 100 lb. reduction from base; 10,000 to 39,999 lb., 60c. per 100 lb. reduction from base; and 40,000 lb. and over, 75c. per 100 lb. reduction from base.

Galvanized sheets for city delivery in base sizes have been raised to 3.85c. a lb. Shipments from warehouses continue to climb and are now above the level prevailing the middle of May a year ago.

## Cast Iron Pipe

The background of this market has improved though actual tonnages are scarce. Most engineers have plans completed for various projects, such as those contemplated at Richmond, Bloomington and Petersburg, Ind. Some old jobs are being revived, as indicated by queries as to whether or not old prices quoted still stand. There continues to be a gain in small miscellaneous orders. Sellers look to legislative acts at Washington to bring tonnage into the market.

## Cold-Rolled Strips

Output has reached 25 per cent of capacity and new business recently booked points to a slightly higher rate. Prices are firm at 2.30c. a lb., delivered Chicago.

## Hot-Rolled Strip

The local market is firm at 1.65c. a lb., Chicago, and third quarter prices are being announced at 1.70c. Output ranges from 30 to 35 per cent of capacity.

## Sheets

Although announcements are not yet official third quarter price schedules are as follows: No. 10 hot-rolled, 1.75c. a lb., Chicago mill; No. 10 hot-rolled annealed, 1.90c.; No. 24 hot-rolled annealed, 2.35c.; No. 10 cold-rolled, 2.25c.; No. 20 cold-rolled, 2.70c., and galvanized, 2.95c. Orders at present quotations are being taken for delivery prior to June 1, though an additional 15 days may be allowed.

Miscellaneous business is heavier and hot mills are producing at close to 50 per cent of capacity.

## Rails and Track Supplies

The Chicago Great Western has ordered 2000 tons of rails from the Illinois Steel Co. and 1000 tons from the Inland Steel Co. An Eastern railroad is reported to be in the market for rails. Although some of the Pennsylvania rails are scheduled to be rolled at Chicago, releases have not reached the mills. Specifications for track accessories are moderately heavier.

## Plates

From numerous sources come reports that tank shops are doing more business in small miscellaneous tanks. Some of this tonnage is now reaching mills. The outstanding award is 1000 tons for the Schlitz brewery at Milwaukee. Some of the fabricators now in the market have been absent for a year or more.

## Structural Material

Included in important awards are bridges for the Missouri Pacific and the Rock Island and highway bridges for the State of Missouri. A public structure at Kansas City calls for 4500 tons. This market shows decided improvement.

## Wire Products

Operations have reached 45 per cent of capacity and sales are above this rate. Producers' stocks continue to dwindle. Demand from farm areas is holding steady in most sections of the country. Manufacturing consumers are more active and in this respect the market is steadily gaining breadth.

## Bars

Specifications are well up to the average in recent weeks and the first three weeks of May point to a month well ahead of April. Consumption by the automobile industry is steady, while use by small and miscellaneous consumers is on the increase. Prices are steady as the time approaches for announcements of third quarter policies.

## Bolts, Nuts and Rivets

Shipments are steady but at a low rate for this time of year. Prospects are that farm implement manufacturers may soon be in the market in a more substantial way.

## Scrap

There is disagreement among buyers and sellers as to the real price trend in this market. However, it is noticeable that dealers are all buying, and not merely against old commitments, which are well covered. At the moment users are out of the market, but they are strict on specifications and are taking all of the first grade scrap that is offered to them. Present supplies are ample for the current rate of mill operations, but there is some question of how much more of this acceptable grade is available.



# Steel Buying Picks Up Sharply in Eastern Pennsylvania

**Both Orders and Shipments Run Far Ahead of April Rate—Pig Iron in Third Advance Since April 1**

**P**HILADELPHIA, May 23.—The volume of new business coming to mills in this district has picked up sharply. Some mills report that orders so far received in May are at a rate which trebles bookings in April and that shipments are proceeding at a rate twice that of the preceding month. Some operations are from stocked raw steel, which accounts for the spread between steel works output, up two points to 18 per cent, and finishing output, which averages about 25 per cent or better. Should business be maintained at its present rate or increased, added open-hearth capacity will be put on soon.

While sheets constitute the largest single item being booked, buying is well diversified, covering semi-finished material, such as billets, and finished lines, such as plates, shapes and merchant steel bars.

The sharp pickup in sheet business has stepped up operations greatly. One nearby sheet mill is running at 75 per cent of capacity and another at 45 per cent of capacity. Fair-sized bookings of sheets at the \$3 ton advance for the third quarter are reported to have been made.

Activity in pig iron also has been stimulated and tonnages have been taken by furnaces at the new levels, advanced \$1 per ton. Scrap prices have been halted temporarily and remain unchanged from last week.

## Pig Iron

Blast furnace operators report greater demand, apparently stimulated by the higher levels for the third quarter. The increase of \$1, effective May 17, was the third advance in prices since April 1. The new prices, at furnace, are: No. 2 foundry, base, \$15.50; No. 2X, \$16; No. 1X, \$16.50; basic, \$15.25; Bessemer (under 2.25 per cent silicon), \$16.50, and malleable, \$16, base. Orders for foundry grades, ranging from carlots to 700 tons, have been booked at the higher price. Foundry melts have increased moderately. Foreign iron prices also have been advanced. The new base of \$12, Birmingham, makes the delivered price of Southern foundry iron \$17.25. The steamship Rio from Barrow, England, is unloading 4050 tons of low phosphorus iron for delivery at Latrobe, Pa.

## Plates, Shapes and Bars

While fabricators report that business has slackened, mills generally are booking larger tonnages, which are coming from miscellaneous users, though railroad orders remain at a low point. The improvement has

given a firmer tone to the market and it is understood that higher prices may soon be announced for the heavy lines. The plate market in this district has been softer than other lines, but with the improvement that has set in plates now are sharing in the stronger tone. Small fabricators, and tank builders in particular, are buying plates more freely. Two eastern Pennsylvania mills shared in the distribution of 2500 tons of plates for the construction of a new and the enlargement of another gas holder for the Philadelphia Gas Co. It is understood that two other eastern Pennsylvania plants will be awarded 1000 tons of shapes for the project. Bids will be opened on Friday for 1400 tons of plates, 5000 tons of structural shapes, 500 tons of reinforcing bars and 250 tons of sheet piling for piers at Baltimore for the Pennsylvania Railroad. The Navy Department will open bids on July 6 for four destroyers, requiring 2000 tons of plates, 900 tons of shapes and 200 tons of steel bars. Bands have been fixed at a price of 1.60c., Pittsburgh, with the usual differentials applying.

## Sheets

Mills report a sharp pickup in orders the past week. While the chief improvement is in full-finished lines for the automotive trade, other users also are buying more actively, both electrical sheets and commercial grades being in demand. Notable among buyers of electrical sheets are makers of electric refrigerators and radios. Mills have stepped up production sharply, one plant now operating at 75 per cent of capacity. Prices of mill-inspected hot-rolled and cold-rolled and galvanized sheets have been increased \$3 in this district in line with advances made in other districts. Made effective at once, specifications will be accepted up to Sept. 30 for shipment not later than Oct. 15. Mill-run hot and cold-rolled sheets were fixed at \$1 per ton under previous levels for inspected sheets. Hot and cold-rolled strip steel has been increased in price \$2 per ton. The new sheet prices, Pittsburgh basis, are: Hot-rolled, No. 10, 1.65c.; hot-rolled, No. 24, 2.25c.; cold-rolled, No. 10, inspected, 2.15c.; mill-run, 1.95c.; cold-rolled, No. 20, inspected, 2.60c.; mill-run, 2.40c.; galvanized, No. 24, 2.85c. The new prices of hot and cold-rolled strip steel are: 1.55c. and 1.90c. The freight rate from Pittsburgh to Philadelphia is 31c. per 100 lb.

## Warehouse Business

Jobbers report a fair improvement in business. Because of inability to

meet prices of foreign material, another warehouse in this district, heretofore dealing only in domestic steel, has been forced to lay in stocks of imported material.

## Imports

The following iron and steel imports were received here last week: 4750 tons of chrome ore from Turkey, and 9 tons of steel tubes and 4 tons of steel bars from Sweden.

## Scrap

Following the recent activity in buying and rapid rise in prices, the scrap market has come to a lull. Prices have not softened, but mills having become supplied for the present are showing less interest in the market. Activity is expected to be resumed soon, however, if business coming to steel mills is maintained at the present rate or is increased.

## Cast Pipe Prices Up in New England

**B**OSTON, May 23.—Sales of pig iron tapered off the past week, amounting to about 1900 tons, as against approximately 2500 tons the preceding week. The Mystic Iron Works booked close to 1000 tons despite its establishing regular 50c. a ton differentials. Eastern Pennsylvania iron prices were boosted \$1 a ton and regular 50c. differentials have been reestablished. No. 2 plain foundry iron is now \$15.50 a ton, furnace, malleable 50c. a ton higher and basic \$15.25 a ton. Local Alabama furnace representatives expect new price schedules for New England any day now. More than 500 tons of this iron has been sold in the past fortnight at \$11 a ton, base, furnace. A further slight increase in the New England melt is noted and additional pig iron business is in sight, although there are no open inquiries in the market. A lack of funds is inhibiting buying among some foundries. Foundry coke makers in this territory are allowing a small discount for spot payment of bills.

The American Steel & Wire Co., Worcester, Mass., did not buy much scrap the past week, and shipments out of New England to Pennsylvania points decreased. Despite the slackening of business, prices, with the exception of those for steel turnings, shafting and street car axles, are holding up well. Most of the business done in No. 1 heavy melting steel the past week was at \$5.25 a ton, on cars shipping point.

Effective yesterday, May 22, pit cast iron pipe was advanced \$2 a ton, and spun pipe \$3.

Billet reinforcing bars have been advanced from 1.91c. a lb., Boston, in car lots, to 2.11c. The market for less than 5-ton lots is \$3 a ton.

# Steel Demand Again Expands in New York District

## Steel Bookings Broaden With Sheet and Tin Plate in the Lead—Pig Iron Sales Are Heavy

NEW YORK, May 23.—Additional price advances and the growing conviction among buyers that they are definitely in a rising market have caused steel bookings to take a new spurt. At the same time there are evidences that consumption is broadening, since unrelaxed pressure for delivery indicates that material is passing rapidly into use. One important mill's bookings for the week were the second largest to date this year.

An increase of \$3 a ton on sheets for third quarter has firmly established the recent advances of \$2 and \$3 for spot shipment. Similarly an advance of \$1 a ton on hot-rolled strip has made good the recent mark-up to 1.55c., Pittsburgh, for spot delivery. Third quarter prices on plates, shapes and bars may be announced this week or next, and there is still talk of impending price revisions on wire products and tin plate. An advance of 25c. a base box, effective July 1, is a possibility on the last-named product.

Jobber demand for standard pipe has improved and the call for wire products from the manufacturing trades is better. Local fabricating prospects are brightened by approaching action on a new section of the West Side elevated highway, estimated to require 10,000 to 15,000 tons of structural steel. Bids on this job are to be taken early in June. Ship repair yards are taking more steel, and railroads are in the market for small tonnages for locomotive repairs. Breweries have been placing a fair number of aging tanks calling for sizable tonnages, but they are expected to figure more largely in the market after beer sales have put them in a more secure financial position. The New York Central will take bids on 7000 tons of rails May 29.

### Pig Iron

Sales aggregated about 12,000 tons in the past week, compared with 3500 tons in the preceding week and 6500 tons two weeks ago. While the bulge in bookings is partly an outgrowth of improved melt, it reflects chiefly a disposition of consumers to cover against a rising market. Prices continue to move higher. Eastern Pennsylvania No. 2 plain foundry iron has been advanced \$1 a ton to a basis of \$15.50, furnace. A new quotational set-up has been effected by Buffalo producers. For rail delivery the following base quotations on Buffalo brands will apply: for the immediate vicinity of Buffalo, \$16; for adjacent territory, \$15.50; for districts beyond and extending as far east as Utica,

\$15, and for all New York State points outside of these groups, \$14.50. For water-rail shipment to northern New Jersey and metropolitan New York districts, competitive factors at destination will be the basis for the furnace price, which in no case will figure back to less than \$14, Buffalo. In addition, Buffalo brands are now subject to 50c. differentials for silicon.

### Reinforcing Bars

An increase of \$4 a ton on concrete bars has been effected. Mill lengths are now quotable at 1.60c. a lb. and cut lengths at 1.75c. a lb., Pittsburgh. Highway mesh has been advanced about \$3 a ton. About 300 tons of bars and 1500 tons of miscellaneous steel will be required for the Rip Van Winkle bridge at Catskill, N. Y. Bids will be taken about June 9 for an extension of the West Side elevated highway, New York, which will call for about 1000 tons. Lettings are still light and are chiefly for State road construction in New York.

### Scrap

No. 1 heavy melting steel for rail shipment has eased off 25c. a ton to \$5.50, while \$6 continues to be paid for export loading on barges. No. 2 steel is being purchased at \$4.50, on cars, and at \$5, on barges. Cast grades and specialties are held firmly at recent levels. Domestic buying has diminished slightly, but shipments are maintaining a satisfactory pace. Foreign buyers, while still seeking to purchase further tonnages of scrap, have not yet yielded to brokers' demands for prices that are realized in domestic consuming markets.

## Southern Iron Advanced 75c. at Cincinnati

CINCINNATI, May 23.—Purchases of Southern pig iron increased during the week just before the effective date of price advances. Total bookings in the district were about 600 tons, of which about 400 tons was Southern iron. Two 100-ton orders for No. 2 Southern iron were from Indiana consumers, while the remainder of the week's business was in small lots. Southern furnaces advanced prices in this district about 75c., but kept quotations 50c. under the nearest Northern furnace competition. The new schedule for Southern iron delivered in Cincinnati is \$16.51, base, making the furnace price approximately \$12.75. Bookings of Southern furnaces, the past week, were at the old quotations. Northern furnaces booked little business during

the week, all important consumers having covered before the recent price boost. Foundry operations are holding at an improved rate, but slowness of machine tool business is keeping tool foundries without appreciable business.

### Coke

Shipments of foundry coke are holding to a better level than last month, but some consumers are still behind their contract rate. Domestic coke is reacting to the usual spring stimulus.

### Steel

For the eighth consecutive week, sheet demand in this district has averaged about 50 per cent of mill capacity. Demand from furniture and electrical appliance manufacturers is light, while building steel demand is almost negligible. The bulk of current production is being absorbed in the automotive, electrical refrigerator and road construction fields.

### Scrap

Easing of scrap markets in the other districts is reflected in renewed quietness in the local market. Trading is still in small lots for prompt consumption, but at prices which indicate market strength. Yard stocks are virtually intact, waiting for higher prices. Some speculative interest has appeared in bids on recent railroad lists.

## Output Rises Further at Birmingham

BIRMINGHAM, May 23.—Blast furnace operations were increased last week, for the second time this month, when Sloss-Sheffield Steel & Iron Co. blew in its No. 2 stack Saturday, on foundry iron. This stack had been banked since Feb. 14. Four blast furnaces are now active, the highest number since the middle of December. In addition to the Sloss-Sheffield furnace, Woodward Iron Co. has one on foundry, Republic Steel Corp. one on foundry and the Tennessee Coal, Iron & Railroad Co. one on basic. The Republic stack may be changed from foundry iron to basic iron around June 10. As a result of two additional furnaces operating this month, May will show the first substantial production increase of the year.

The pig iron market has a better tone. Shipments of all three merchant producers are ahead of the same period in April. Current sales are limited but satisfactory, in view of the advance bookings already made for this quarter. Some business has already been placed for the third quarter at the present base price of \$12, which is firm.

Stove plant activities have shown improvement throughout the South during the past several weeks. A price advance of around 5 per cent in stoves will take effect on June 1



and there is talk of another advance for July. Pressure pipe has not yet shown expected strength. Pipe plant operations, new tonnage and shipments are only slightly ahead of April.

Scrap continues to show strength, and a general advance in prices, long stationary, has been made. Contract shipments have picked up, as well as new bookings.

### Steel

A moderate upward trend in current tonnage continues and the past two weeks have been somewhat above recent levels. Demand is still made up mostly of small, diversified orders for light products. However, they have been more numerous and sufficient to provide comfortable tonnage. Some of the tonnage is for depleted stocks but most of it is, apparently, for current use. Sheet production and shipments have been following a steady course. Fence demand has dropped, on account of seasonal change, but bale tie business is now opening up. Prices are firm and unchanged.

Open-hearth production has advanced again for the second successive week. Nine open-hearth units were active last week until Friday, when a tenth unit was added. The schedule this week calls for 10. With one exception, this is the largest number since January and February of 1932.

## Pig Iron and Scrap Higher at St. Louis

ST. LOUIS, May 23.—Pig iron prices advanced 50c. a ton at Chicago, Birmingham and Granite City during the last week. Demand was quite active, although the sales were said to be not so heavy as in preceding weeks. Transactions were in lots of from 100 to 400 tons.

### Steel

Open-hearth operations were stepped up during the last week to more than 33 per cent of capacity in the St. Louis industrial district.

The prices of all steel products have firmed up considerably. The greatest activity is said to be in wire products, sheets and pipe, the latter being especially active in the oil fields, with plates, shapes and bars lagging. Jobbers seem more eager to cover on their requirements than other buyers.

The award of 885 tons for a bridge for the Missouri Pacific Railway at Myrtle, Ark., has been made to Stupp Brothers Bridge & Iron Co.

### Scrap

A district melter has bought a round tonnage of No. 2 heavy melting steel, and other mills are figuring with dealers for scrap. The market has advanced 25c. to \$1 a ton during the last week, because of local purchases and strength in the Valley and Chicago markets.

# Miscellaneous Demand for Steel Increases at Cleveland

**Inquiry Is Stimulated by Price Advances—Cleveland Ingot Output Rises Another Three Points to 44 Per Cent of Capacity**

CLEVELAND, May 23.—Inquiry for finished steel from miscellaneous consumers has gained, the demand evidently being stimulated by announced and expected price advances for the third quarter. Specifications continue to come out in good volume, although the tonnage booked probably gained only slightly during the week. Orders from the automotive industry are holding up to recent volume and cover a portion of June requirements. This industry is covered for the present quarter and already has made some inquiry for steel for the third quarter, this development being brought out by announced price advances on sheets and strip. The real test of higher prices is expected when the automotive industry makes its third quarter commitments.

Ingot output in Cleveland this week again increased three points to 44 per cent of capacity through the addition of another open-hearth furnace by the Otis Steel Co. The Cleveland district, including Lorain, is now operating at 50 per cent of capacity. The Corrigan-McKinney Steel Co. may start up another blast furnace, although this has not been definitely decided.

The oil industry has increased its demand for steel. Orders from railroads continue light. The Nickel Plate railroad is planning to scrap 6000 cars. In wire products there is a good demand from manufacturers of wire fence and barbed wire, but nails are rather dull. Consumers generally are closely following the price situation and considerable tonnage for June shipment probably will be brought out for products on which price advances for the third quarter are definitely established. Advances of \$3 a ton on sheets, \$1 a ton on hot strip and \$2 a ton on cold strip have been announced for that delivery by some of the mills. No producer has as yet named third quarter prices on bars, plates and shapes. Alloy steel bar prices probably will be reaffirmed for the coming quarter.

### Pig Iron

The market quieted down in both sales and inquiries following the price advances a week ago previous to which considerable tonnage was booked at old prices. However, quite a few sales have been made at the higher price levels, one producer reporting the sale of several lots aggregating 4500 tons at the advance. A considerable number of consumers have not yet covered for the third quarter and probably will have to pay

the higher prices. Shipments continue good. Demand from the motor car industry is being well maintained.

### Sheets

Price advances of \$3 a ton on all grades except enameling sheets have been announced for the third quarter by some producers and others are expected to make similar advances. Some also have announced new classifications for cold-rolled sheets, one class including sheets to be known as mill-run grades carrying no guarantee for surface and the other grade inspected for surface, the latter including auto body and metal furniture sheets which will be quoted \$4 a ton above the mill-run grades. Demand is holding up well from the automotive and refrigerator industries. Black sheets are firm at 2.10c. for current business. Orders from paint manufacturers have stimulated demand for tin plate.

### Iron Ore

Stocks of Lake Superior ore on docks and at furnace yards were reduced 4,630,905 tons during the year ended May 1. The amount at furnaces on that date was 23,878,614 tons, and the total at furnaces and docks was 28,847,977 tons. Ore consumed in April amounted to 771,972 tons, an increase of 178,948 tons. This compares with 1,039,799 tons, in April last year. Central district furnaces melted 459,377 tons in April, a gain of 113,251 tons. Lake front furnaces used 311,907 tons, an increase of 66,838 tons. There were 42 furnaces in blast using Lake ore April 30, a gain of seven for the month.

### Warehouse Business

The spread between mill and warehouse prices has been materially reduced, except for small lots, in new quantity differentials adopted by Cleveland warehouses and applying to hot-rolled bars, plates, shapes, hoops and bands and blue-annealed sheets. The narrower margin is expected to divert to warehouses some business that has been going to mills. Heretofore 1000 lb. or less carried the base price. Under the new schedule lots of less than 400 lb. carry a 50c. extra. Other new prices are 1000 to 5000 lb., 20c. per 100 lb. off base; 5000 to 10,000 lb., 40c. off base, and 10,000 to 40,000 lb., 60c. off base. Cutting extras have been revised.

### Strip Steel

Specifications for hot-rolled strip from the automotive industry are holding up to recent volume and de-

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mand for both hot and cold-rolled material from diversified industries shows some improvement. Hot-rolled strip is now firm at 1.55c., Pittsburgh, the 1.45c. price having been withdrawn, and some producers have announced an advance to 1.60c. for the third quarter. For cold-rolled strip some makers are asking 2c., Cleveland, an advance of \$2 a ton.

### Reinforcing Bars

Distributors have advanced prices \$4 a ton on new billet steel reinforcing bars to 1.75c., Cleveland. The mill price has stiffened and appears now to be firmly held at 1.50c., Cleveland, for mill lengths.

### Bars, Plates and Shapes

Demand for merchant bars from diversified industries continues to expand, and orders are holding up to recent volume from the automotive industry. Plates are moving slightly better in small lots. With activity in the building field still restricted call for structural shapes is light. Plans for highway bridge and road building work in Ohio for this year have not been formulated. Bars are firm at 1.65c., Cleveland.

### Scrap

The easier market situation reported a week ago is still in evidence. There has been no new mill buying and all rail shipments to some Youngstown district consumers were temporarily held up because of the large amount of scrap coming in, part of which was scrap shipped by water from Lake Michigan ports that was transferred to rail at a Lake Erie port. Prices are holding steady after the slight softening a week ago.

## Pipe Lines

Texas Cities Gas Co., 1915 Wood Street, Dallas, Tex., H. C. Morris, president, plans steel pipe lines at Galveston, Tex., for gas distribution. Cost about \$55,000.

Washington Gas Light Co., 1100 Twenty-ninth Street, N. W., Washington, plans about 50 miles of steel pipe lines for main distribution and commercial service in different parts of city and Georgetown district. Work will be carried out in connection with expansion and improvement program totaling over \$1,700,000.

Shell Pipe Line Co., St. Louis, operated by Shell Union Oil Corp., Shell Building, same city, is making surveys for steel pipe line from Cockfield oil district, Polk County, to connect with main trunk line from east Texas oil fields, about nine miles.

Bureau of Water Works and Supply, 222 North Hill Street, Los Angeles, plans 84,950 ft. of pressure pipe, from 5 to 10½-in. diameter, for water supply system from Mono Basin district, about 350 miles from city. Work will be carried out in connection with \$8,000,000 bond issue for water supply, including tunnels and other structures.

Montreal Light, Heat & Power, Consolidated, Montreal, plans steel pipe gas lines along south side of St. Lawrence River, for service in South Shore district.

Gas Fuel Service Co., Hanford, Cal., has plans for a four-mile pipe line for natural gas distribution to cities in Kings and Fresno counties.

## Valley Steel Production Now Exceeds 40 Per Cent

YOUNGSTOWN, May 23.—Steel orders in the Valleys are still coming in at a good rate, but expansion in the last week has been somewhat restricted. Specifications for practically all lines of finished products are running well ahead of April, but the increases are less pronounced as the month reaches its close. Nevertheless, steel company executives believe that present momentum is sufficient to prevent any marked falling off during June, even though some seasonal contraction might be expected.

The recent steady rise in production of both pig iron and steel has been the most spectacular characteristic of the upward movement in this district. In the immediate Valley territory 10 blast furnaces are now active as compared with only four two months ago, while the number of open-hearths melting has tripled. Raw steel production in the territory has passed the 40 per cent mark and a 45 per cent rate may be reached before the end of the month. At this figure operations will have again reached the profitable level for most producers and rising prices for sheets and strip steel will add to earnings in the last half of the year. Finishing mill schedules vary rather sharply, ranging from 75 per cent in tin mills to less than 20 per cent in the case of pipe.

Shipments to the automotive industry are well sustained and include sheets, strip steel and bars. It is estimated that fully half of the steel now moving out of the district is going, either directly or indirectly, for automotive purposes. Local fabricators of building products, steel barrel producers and stamping plants are also taking a good share. Movement of pipe is expanding gradually, but lack of line pipe tonnage prevents any marked expansion in this department. Plates are going to fabricators in slightly better volume, and movement of wire products is still expanding. Primary materials are still in good demand, although the rise in scrap prices seems to have been halted. Increased pig iron quotations have developed little new business, although some buyers covered prior to the advance. The semi-finished market is strong at \$26, Youngstown, and shipments are comparatively heavy.

The opening of third quarter books on sheets and strip steel at higher levels is expected to restore strength to the flat-rolled market. Recent higher asking prices on sheets and strip have applied to little tonnage because consumers had already been covered for the second quarter. Restoral of profitable extras on cold-rolled sheets

is particularly significant. On cold-rolled tonnage going to the automotive industry, prices have been ruinously low and the protracted buyers' market had left the sheet industry with scarcely any basis on which to quote. Announcement of higher prices on bars and plates is expected before the first of the month, while wire products have already been moved up. No change in quotations on pipe is expected.

## Pig Iron Quiet, Scrap Weaker in Canada

TORONTO, ONT., May 23.—The Canadian iron and steel industry shows some bright spots, but new business is slow. The automotive branch is fairly active, with General Motors reporting improvement and adding to its staff at Oshawa. The mining industry continues to furnish a good volume of business in the way of steel orders, tool and equipment purchases. No large contracts have been awarded recently, however.

Demand for pig iron has tapered off. Melters are entering the market at intervals with orders for single carlots. Orders for the week were estimated at around 300 tons. No inquiries are out and producers have no orders for second quarter delivery. Prices are firm but unchanged.

Both Toronto and Montreal scrap dealers have made sharp reductions in their buying price lists because of the limited resale demand. With but few exceptions, both iron and steel grades have been dropped to lower levels. Similar conditions prevail in the Montreal district.

## Cast Iron Pipe

Washington Suburban Sanitary Commission, Tower Building, Washington, plans pipe line in Montgomery and Prince George counties, Md., for water supply.

Wilmington Suburban Water Co., Wilmington, Del., plans installation of 8-in. pipe in connection with water system in Brandywine Hundred district. Project includes two 100,000-gal. capacity steel standpipes. Cost over \$200,000.

Clear Lake, Iowa, R. R. Rogers, city clerk, plans purchase of pipe for main and auxiliary water service.

Berlin, Wis., plans installation of 9600 lin. ft. of 4 to 8-in. water main extensions. W. H. Weiss is city clerk.

Los Angeles has taken bids on 646 tons 16 and 20-in.

Oakland, Cal., will take bids May 26 on 1548 tons of 4 to 8-in.

Seattle has tentatively set June 5 for opening bids on 770 tons of 20-in. for Railway Avenue seawall.



# Non-Ferrous Metals Are Firm, Though Demand Lags

Copper, at 7c., Resists Cheaper Second-Hand Metal—  
Zinc Up on Higher Ore Prices; Lead, Tin Are Quiet

NEW YORK, May 23.—Demand for electrolytic copper in the past seven-day period has lacked vigor. The continued absence of significant buying is chiefly ascribable to the generally well-covered position of large consumers. A favorable market outlook is sustained, however, by reports of improved activity among fabricators. Consumer stocks are slowly, but gradually, being decreased, so that sellers look for an expanding demand before long. Despite the current lack of buying support, electrolytic is very firm at 7c. a lb., delivered Connecticut. Cheaper offerings of metal in second hands yesterday failed to influence adversely the price views of first-hand sellers. The copper market is absorbing further strength from prospects of concerted action in respect to affecting a satisfactory agreement for orderly reduction of heavy producer stocks. The first step necessary for

such a move would be a realignment of producing schedules. Although no plans have been made public, it is understood that large producers are in favor of curtailing operations during the summer months, when the resultant effects of unemployment would not be so drastic as in other seasons.

Turnovers in the foreign markets during the past week were moderate. Continental prices ranged fractionally higher than domestic quotations, with sales reported at 7c. to 7.05c. American offerings in Europe at 7.10c. failed to induce buying.

## Tin

After fairly active trading early last week, the New York tin market has encountered a lull. Buying interest virtually dried up toward the week-end, but inquiry improved slightly today. Sellers are expectant that buying will expand again in the

near future. This view is based upon the assumption that a large share of recent heavy tin purchases went into consumption. With tin plate operations, particularly, maintaining a brisk pace, the concomitant inroads into tin stocks are expected to open up imperative replenishment of supplies. A decline in the London market and profit-taking in New York depressed the spot Straits price yesterday to 35.50c. a lb., New York. Sales were made on that basis for delivery through August. With the reappearance of some inquiry today, however, the price recovered to 36c. Last week's bookings in New York totaled about 500 tons, while in London the turnover reached approximately 3200 tons. London quotations, as a consequence of the strong demand, scored moderate gains for the week. Today's postings in that market were £186 2s. 6d. a ton for spot standard, £186 for future standard, and £203 12s. 6d. for spot Straits. Today's Singapore market, at £203 10s., reflected a net advance of almost £6 for the week. British warehouse stocks were cut 433 tons last week to 25,574 tons. Straits shipments through May 20 totaled 3473 tons.

## Lead

Statistics for April disclosed an increase of 2650 tons in smelters' stocks. The increase, however, was attributable to a gain in production of secondary lead. Primary output was reduced slightly, and shipments increased to 25,000 tons from 21,950 tons in March. Smelters' stocks at the end of April totaled 196,901 tons, compared with 194,251 tons at the close of March. Marketwise, lead has remained lethargic. The leading producers are enjoying a fair backlog of orders and remain firm in their price views. For shipment through June, prices are unchanged at 3.65c. a lb., New York, and 3.52½c., St. Louis.

## Zinc

With a further rise in Joplin ore prices on Saturday, prime Western manifested strong tendencies today, when offerings at under 3.77½c. a lb., East St. Louis, or 4.14½c., New York, disappeared. The continued uptrend in ore values has sponsored a growing reluctance of smelters to release metal at current prices. At the present price of \$27 for mill grades, the return for prime Western metal on the current basis is held to be below cost of conversion. Sellers have generally restricted sales; although in one or two quarters pressure to dispose metal has accounted for a moderate volume of business for the week.

National Engineering Co., 549 West Washington Boulevard, Chicago, has issued a new general mixer catalog showing the seven sizes of Simpson Intensive Mixers which are manufactured by the company. These are used for plastic and semi-plastic materials as well as for sand preparation.

## The Week's Prices. Cents Per Pound for Early Delivery

	May 17	May 18	May 19	May 20	May 22	May 23
Electrolytic copper, N. Y.*	6.75	6.75	6.75	6.75	6.75	6.75
Lake copper, New York	7.00	7.00	7.00	7.00	7.00	7.00
Straits tin, Spot, N. Y.	36.37½	36.62½	36.00		35.50	36.00
Zinc, East St. Louis	3.70	3.70	3.70	3.70	3.75	3.77½
Copper, New York	4.07	4.07	4.07	4.07	4.12	4.14½
Lead, St. Louis	3.52½	3.52½	3.52½	3.52½	3.52½	3.52½
Lead, New York	3.65	3.65	3.65	3.65	3.65	3.65

\*Refinery quotations; price ¼c. higher delivered in Connecticut.

Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.  
Nickel electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.  
Antimony, 6.25c. a lb. New York.  
Brass ingots, 85-5-5-5, 6.75c. a lb., New York and Philadelphia.

## From New York Warehouse Delivered Prices, Base per Lb.

Tin, Straits pig.	38.00c. to 39.00c.
Tin, bar.	40.00c. to 41.00c.
Copper, Lake.	8.00c. to 8.75c.
Copper, electrolytic.	7.75c. to 8.25c.
Copper, castings.	7.50c. to 8.50c.
*Copper sheets, hot-rolled.	14.62½c.
*High brass sheets.	12.37½c.
*Seamless brass tubes.	14.00c.
*Seamless copper tubes.	14.12½c.
*Brass rods.	9.87½c.
Zinc, slabs.	5.00c. to 5.50c.
Zinc sheets (No. 9), casks.	9.25c. to 9.50c.
Lead, American pig.	4.62½c. to 5.62½c.
Lead, bar.	6.00c. to 7.00c.
Lead, sheets.	7.25c.
Antimony, Asiatic.	8.00c. to 9.00c.
Alum., virgin, 99 per cent plus.	23.30c.
Alum. No. 1 for remelting, 98 to 99 per cent.	17.00c. to 18.00c.
Solder, ½ and ⅓.	23.50c. to 24.50c.
Babbitt metal commercial grade.	21.00c. to 42.00c.

\*These prices are also for delivery from Chicago and Cleveland warehouses.

## From Cleveland Warehouse Delivered Prices per Lb.

Tin, Straits pig.	39.50c.
Tin, bar.	41.50c.

Copper, Lake.	7.87½c.
Copper, electrolytic.	7.87½c.
Copper, casting.	7.62½c.
Zinc, slab.	4.50c. to 5.00c.
Lead, American pig.	4.37½c. to 4.87½c.
Lead, bar.	7.75c.
Antimony, Asiatic.	8.50c.
Babbitt metal, medium grade.	17.75c.
Babbitt metal, high grade.	43.50c.
Solder, ½ and ⅓.	23.75c.

## Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible.	5.50c.	6.25c.
Copper, hvy. and wire	5.25c.	6.125c.
Copper, light and bottoms.	4.25c.	5.00c.
Brass, heavy.	2.75c.	3.375c.
Brass, light.	2.25c.	2.75c.
Hvy. machine composition.	3.75c.	4.50c.
No. 1 yel. brass turnings.	3.25c.	4.00c.
No. 1 red brass or compos. turnings.	3.625c.	4.125c.
Lead, heavy.	2.625c.	3.25c.
Zinc.	1.75c.	2.25c.
Cast aluminum.	5.00c.	6.00c.
Sheet aluminum.	10.25c.	12.00c.

# Prices of Finished and Semi-Finished Steel, Coke, Coal, Cast Iron Pipe

## BARS, PLATES, SHAPES

### Iron and Steel Bars

Soft Steel	
Base per Lb.	
Fab. Pittsburgh mill	1.60c.
Fab. Chicago	1.70c.
Del'd Philadelphia	1.91c.
Del'd New York	1.95c.
Del'd Detroit	1.90c.
Fab. Cleveland	1.85c.
Fab. Lackawanna	1.70c.
Fab. Birmingham	1.75c.
C.I.F. Pacific ports	2.10c.

### Billet Steel Reinforcing

(All lengths as quoted by distributors)	
Fab. P'gh mills	1.55c. to 1.75c.
Fab. Birmingham	1.55c. to 1.75c.
Fab. Cleveland	1.55c. to 1.75c.
Fab. Chicago	1.55c. to 1.90c.

### Roll Steel

Fab. mills, east of Chicago dist.	1.30c.
Fab. Chicago Heights	1.30c. to 1.65c.
Fab. mills	1.30c. to 1.65c.

### Iron

Common iron, .....	Chicago .....	1.60c.
Refined iron, f.o.b. P'gh mills	.....	2.75c.
Common iron, del'd Philadelphia	.....	1.85c.
Common iron, del'd New York	.....	1.90c.

### Tank Plates

Base per Lb.	
Fab. Pittsburgh mill	1.50c. to 1.60c.
Fab. Chicago	1.70c.
Fab. Birmingham	1.75c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.4935c. to 1.5935c.
Fab. Coatesville	1.40c. to 1.50c.
Fab. Sparrows Point	1.40c. to 1.50c.
Del'd New York	1.5935c. to 1.6935c.
C.I.F. Pacific ports	2.00c.
Wrought iron plates, f.o.b. P'gh	3.90c.

### Structural Shapes

Base per Lb.	
Fab. Pittsburgh mill	1.60c.
Fab. Chicago	1.70c.
Fab. Birmingham	1.75c.
Fab. Lackawanna	1.70c.
Fab. Bethlehem	1.70c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.7495c.
Del'd New York	1.8675c.
C.I.F. Pacific ports (standard)	2.10c.
C.I.F. Pacific ports (wide flange)	2.20c.

### Steel Sheet Piling

Base per Lb.	
Fab. Pittsburgh	1.90c.
Fab. Chicago mill	2.05c.
Fab. Buffalo	2.00c.

### Alloy Steel Bars

(Fab. Pittsburgh, Chicago, Buffalo, Massillon or Canton.)	
Alloy Quantity Bar Base,	

S.A.E.	
Series	Differential
Numbers	per 100 Lb.
2000 (1/2% Nickel)	0.25
2100 (1/2% Nickel)	0.35
2200 (3/4% Nickel)	1.50
2300 (5% Nickel)	0.25
2400 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	2.80
4400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.10 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.40 Molybdenum, 1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	0.20
6100 Chromium Vanadium Bar	1.20
4100 Chromium Vanadium Spring Steel	0.95
9250 Biflon Manganese Spring Steel (Bates)	0.25
Round and Square	0.50
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is 1/4c. a lb. higher, with standard classification for cold-finish alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross lot is the net price for bars of the same analysis. Billets under 4 x 4 in. carry the steel bar base. Slabs with a section area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2 1/2 in. thick, regardless of sectional area, take the bar price.

### Cold Finished Bars\*

Fab. f.o.b. Pittsburgh Mill	1.70c.
Fab. f.o.b. Chicago	1.75c.
Fab. Cleveland	1.75c.
Fab. Buffalo	1.75c.
Fab. Detroit	1.90c.
Fab. eastern Michigan	1.90c.
Shafting, ground, f.o.b. mill	1 1/2 in. 3.00c.
	1-3/16 to 1 1/4 in. 2.50c.
	1-9/16 to 1 1/2 in. 2.35c.
	1-15/16 to 2 1/4 in. 2.20c.
	2-15/16 to 6 in. 2.05c.

\* In quantities of 10,000 to 19,999 lb.

## SHEETS, STRIP, TIN PLATE TERNE PLATE

### Sheets

#### Hot-Rolled

No. 10, f.o.b. Pittsburgh	1.50c. to 1.65c.
No. 10, f.o.b. Chi'o mill	1.60c. to 1.75c.
No. 10, del'd Philadelphia	1.81c. to 1.96c.
No. 10, f.o.b. Birm'g'm	1.65c. to 1.80c.
No. 10, c.i.f. Pacific Coast ports	2.12 1/2c.

#### Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.10c. to 2.25c.
No. 24, f.o.b. Chi'o mills	2.20c. to 2.35c.
No. 24, del'd Philadelphia	2.41c. to 2.56c.
No. 24, f.o.b. Birm'g'm	2.25c. to 2.40c.
No. 24, c.i.f. Pacific Coast ports	2.75c.
No. 24, wrought iron, Pittsburgh	4.30c.

#### Heavy Cold-Rolled (Mill Run)

No. 10 gage, f.o.b. Pitts'h	1.95c.
No. 10 gage, f.o.b. Chicago mills	2.00c.
No. 10 gage, del'd Phila.	2.20c.
No. 10 gage, del'd Pacific Coast ports	2.70c.

#### Light Cold-Rolled (Mill Run)

No. 20 gage, f.o.b. Pitts'h	2.40c.
No. 10 gage, f.o.b. Chicago mills	2.50c.
No. 20 gage, del'd Phila.	2.71c.
No. 20 gage, del'd Pacific Coast ports	2.95c.

#### Auto Body and Steel Furniture

No. 10, f.o.b. Pittsburgh	2.15c.
No. 20, f.o.b. Pittsburgh	2.60c.
No. 20, f.o.b. Chicago	2.70c.

#### Galvanized Sheets

No. 24, f.o.b. Pittsburgh	2.70c. to 2.85c.
No. 24, f.o.b. Chicago mills	2.95c.
No. 24, del'd Philadelphia	3.16c.
No. 24, f.o.b. Birmingham	2.85c.
No. 24, c.i.f. Pacific Coast ports	3.27c.
No. 24, wrought iron, Pittsburgh	4.30c.

#### Long Terne

No. 24, unassorted, 8-lb. coil	f.o.b. Pittsburgh, 2.75c. to 2.90c.
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#### Tin Enamel Coating

No. 20, c.o.b. Pittsburgh	2.90c.
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#### Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.30c.
No. 28, Chicago mill	2.40c.

#### Tin Plate

Base per Box	
Standard cokes, f.o.b. P'gh district mill	\$4.25
Standard cokes, f.o.b. Gary	4.35

#### Terne Plate

(F.o.b. Morgantown or Pittsburgh)	
(Per Package, 20 x 28 in.)	
8-lb. coating I.C.	\$9.70
15-lb. coating I.C.	11.00
20-lb. coating I.C.	11.90
25-lb. coating I.C.	13.00
30-lb. coating I.C.	13.80
40-lb. coating I.C.	15.30

#### Hot-Rolled Hoops, Bands, Strips and Flats under 1/4 in.

Base per Lb.	
All widths up to 24 in., Pittsburgh	1.55c. to 1.60c.
All widths up to 24 in., Chicago	1.60c. to 1.70c.
Cooperage stock, P'gh	1.55c. to 1.60c.
Cooperage stock, Chicago	1.65c. to 1.70c.

#### Cold-Rolled Strips

Fab. Pittsburgh	2.00c.
Fab. Cleveland	2.00c.
Del'd Chicago	2.30c.
Fab. Worcester	2.20c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	2.60c.

#### WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)	
Extras of 10c. a 100 lb. on mixed and joint carloads, 20c. on pool carloads and 30c. on less than carloads are applied on all merchant wire products. In carloads and mixed carloads a discount of 10 per cent on extras is allowed.	

#### To Manufacturing Trade

Bright wire	2.10c.
Spring wire	3.10c.

#### To Jobbing Trade

Base per Keg	
Standard wire nails	\$1.85
Smooth coated nails	1.85
Galvanized nails	3.35

#### Base per 100 Lb.

Smooth annealed wire	\$2.25
Smooth galvanized wire	2.60
Polished staples	2.55
Galvanized staples	2.90
Barbed wire, galvanized	2.35

Woven wire fence No. 9 cage, base column, per net ton \$30.00

Chicago and Anderson, Ind., mill prices are \$1 a ton over Pittsburgh base; Duluth, Minn. and Worcester, Mass., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.

## STEEL AND WROUGHT PIPE AND TUBING

### Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio Mills

Butt Weld	
Inches	Black Galv.
1/4	55 33
3/4	60 42
1	65 44
1 1/2	69 49
2	71 62

Lap Weld	
2	66 37
2 1/2	69 44
3	71 55
3 1/2	73 57
4	75 58

Butt Weld, extra strong, plain ends	
1/4	52 37
3/4	58 45
1	63 44
1 1/2	68 49
2	71 62

Lap Weld, extra strong, plain ends	
2	65 37
2 1/2	69 44
3	71 55
3 1/2	73 57
4	75 58

Discounts on steel and wrought iron pipe are not subject to any points or preferential.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2 1/2 points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

### Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel	
2 in. and 2 1/2 in.	38
3 in.	40
3 1/2 in.	42
4 in.	44
4 1/2 in.	46

On lots of a carload or more, the above base discounts are subject to a preferential of two five on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.	
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### Standard Commercial Seamless Boiler Tubes

Cold-Drawn	
1 in.	61
1 1/4 in.	63
1 1/2 in.	64
2 in.	67
2 1/2 in.	69

Hot Rolled	
2 and 2 1/2 in.	38
3 in.	40
3 1/2 in.	42
4 in.	44
4 1/2 in.	46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb. base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. in lighter than standard sizes take the mechanical tube list and discounts. Intermediate sizes and gauges not listed take price of next larger outside diameter and heavier gage.

### Seamless Mechanical Tubing

Per Cent Off List  
Carbon, 0.10% to 0.30% base (carloads) 55  
Carbon, 0.30% to 0.45% base 50  
Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

## RAILS AND TRACK SUPPLIES

### Rails

Per Gross Ton	
Standard, f.o.b. mill	\$40.00
Light (from billets), f.o.b. mill	30.00
Light (from rail steel, f.o.b. mill)	28.00

### Track Equipment

Base per 100 Lb.	
Spikes, 9/16 in. and larger	\$2.15
Spikes, 1/2-in. and larger	2.30
Spikes, boat and barge	2.60
Tie plates, steel	1.75
Angle bars	3.55
Track bolts, to steam railroads	3.50
Track bolts, to jobbers, all sizes, (per 100 count)	73 per cent off list

## BOLTS, NUTS, RIVETS AND SET SCREWS

### Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List	
Machine bolts	15
Carriage bolts	15
Lag bolts	75
Plow bolts, Nos. 1, 2, 3 and 7 heads	75
Hot-pressed nuts, blank or tapped, square	75
Hot-pressed nuts, blank or tapped, hexagonal	15
C.p.e. and t. square or hex nuts, blank or tapped	75

### Bolts and Nuts

Per Cent Off List

Semi-finished hexagon nuts	75
Semi-finished hexagon castellated nuts, S.A.E.	75
Store bolts in packages, P'gh	75, 25 and 10
Store bolts in packages, Chicago	75, 25 and 10
Store bolts in pkgs., Cleveland	75, 25 and 10

Store bolts in bulk, P'gh	80
Store bolts in bulk, Chicago	85
Store bolts in bulk, Cleveland	85
Tire bolts	60 and 10

Discounts of 75 per cent off on bolts and nuts applied an carload business with jobbers and large consumers.

### Large Rivets

Base per Lb.	
F.o.b. Pittsburgh or Cleveland	\$2.25
F.o.b. Chicago	2.35

### Small Rivets

Per Cent Off List	
F.o.b. Pittsburgh	70, 10 and 10
F.o.b. Cleveland	70, 10 and 10
F.o.b. Chicago	70, 10 and 10

### Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 250 lb. or more)

Per Cent Off List	
Milled cap screws, 1 in. dia. and smaller	50
Milled standard set screws, case hardened, 1 in. dia. and smaller	50
Milled headless set screws, cut thread 1/4 in. and smaller	75 and 10
Upset hex. head cap screws, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller	85 and 10
Upset set screws, sq. head	80
Milled studs	70

## SEMI-FINISHED STEEL

### Billets and Blooms

Per Gross Ton	
Rolling, 4-in. to 8-in., inclusive	\$28.00
Rolling, 4-in. to 8-in., inclusive	28.00
Rolling, 4-in. to 8-in., inclusive	28.00
Rolling, 4-in. to 8-in., inclusive	28.00
Rolling, 4-in. to 8-in., inclusive	28.00

Rolling, 4-in. to 8-in., inclusive	28.00
Rolling, 4-in. to 8-in., inclusive	28.00
Rolling, 4-in. to 8-in., inclusive	28.00
Rolling, 4-in. to 8-in., inclusive	28.00
Rolling, 4-in. to 8-in., inclusive	28.00

Rolling, 4-in. to 8-in., inclusive	28.00
Rolling, 4-in. to 8-in., inclusive	28.00
Rolling, 4-in. to 8-in., inclusive	28.00
Rolling, 4-in. to 8-in., inclusive	28.00
Rolling, 4-in. to 8-in., inclusive	28.00

Rolling, 4-in. to 8-in., inclusive	28.00
Rolling, 4-in. to 8-in., inclusive	28.00
Rolling, 4-in. to 8-in., inclusive	28.00
Rolling, 4-in. to 8-in., inclusive	28.00
Rolling, 4-in. to 8-in., inclusive	28.00

Rolling, 4-in. to 8-in., inclusive	28.00
Rolling, 4-in. to 8-in., inclusive	28.00
Rolling, 4-in. to 8-in., inclusive	28.00
Rolling, 4-in. to 8-in., inclusive	28.00
Rolling, 4-in. to 8-in., inclusive	28.00

Rolling, 4-in. to 8-in., inclusive	28.00
Rolling, 4-in. to 8-in., inclusive	28.00
Rolling, 4-in. to 8-in., inclusive	28.00
Rolling, 4-in. to 8-in., inclusive	28.00
Rolling, 4-in. to 8-in., inclusive	28.00

Forging quality, Pittsburgh .....	\$1.
Forging quality, Youngstown .....	\$1.



Skuip	
(F.o.b. Pittsburgh or Youngstown)	
Grooved	Per Lb. 1.60c.
Universal	1.60c.
Sheared	1.60c.

Wire Rods	
(Common soft, base)	
Pittsburgh	Per Gross Ton \$35.00
Cleveland	35.00
Chicago	36.00

## COKE, COAL AND FUEL OIL

Coke	
Furnace, f.o.b. Connellsville	
Prompt	Per Net Ton \$1.75 to \$2.00
Foundry, f.o.b. Connellsville	
Prompt	2.50 to 4.00
Foundry, by-product, Chicago areas, for delivery outside switching districts	7.00
Foundry, by-product, delivered in Chicago switching district	7.75
Foundry, by-product, New England, delivered	10.00
Foundry, by-product, Newark or Jersey City, del'd	8.20 to 8.81
Foundry, by-product, Phila. land, delivered	7.82
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. areas	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal	
Mine run steam coal, f.o.b.	
W. Pa. mines	Per Net Ton \$1.00 to \$1.15
Mine run coking coal, f.o.b.	
W. Pa.	1.10 to 1.25
Gas coal, 4-in., f.o.b. Pa. mines	1.25 to 1.40
Mine run gas coal, f.o.b. Pa. mines	1.20 to 1.30
Steam slack, f.o.b. W. Pa. mines	0.25 to 0.35
Gas slack, f.o.b. W. Pa. mines	0.35 to 0.45

Fuel Oil	
Per Gal. f.o.b. Rapahoe, N. J.	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. f.o.b. Baltimore	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. del'd Chicago	
No. 3 industrial fuel oil	2.25c.
No. 5 industrial fuel oil	2.65c. to 2.75c.
Per Gal. f.o.b. Cleveland	
No. 3 distillate	5.00c.
No. 4 industrial	4.50c.

## REFRACTORIES

Fire Clay Brick	
Per 1000 f.o.b. Works	
High-heat intermediate	\$30.00
Duty Brick Duty Brick	30.00
Penn.	\$33.00 to \$35.00
Maryland	35.00
New Jer.	\$44.00 to \$7.00
Ohio	35.00
Kentucky	35.00
Missouri	35.00
Illinois	35.00
Ground fire clay, per ton	6.50

Chrome Brick	
Per Net Ton	
Standard size	\$42.50 to \$45.00

Silica Brick	
Per 1000 f.o.b. Works	
Pennsylvania	\$33.00 to \$35.00
Chicago	47.00
Birmingham	50.00
Silica clay, per ton	8.00

Magnesite Brick	
Per Net Ton	
Standard sizes, burned, f.o.b. Baltimore and Chester, Pa.	\$61.50 to \$65.00
Unburned, f.o.b. Baltimore	52.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	\$38.50 to 45.00
Domestic, f.o.b. Chewelah, Wash.	20.90

CAST IRON PIPE	
Per Net Ton	
6-in. and larger, del'd Chicago	\$41.40
4-in., del'd Chicago	44.40
6-in. and larger, del'd New York	39.30
4-in., del'd New York	35.30 to 36.30
6-in. and larger, Birm'ham	35.00
4-in., Birmingham	36.00
Class "A" and gas pipe, \$3 extra.	

VALLEY	
Per Gross ton, f.o.b. Valley furnace:	
Basic	\$14.00 to \$15.00
Bessemer	15.00 to 16.00
Gray Forge	14.50 to 15.50
No. 2 foundry	14.50 to 15.50
No. 3 foundry	14.00 to 15.00
Malleable	14.50 to 15.50
Low phos., copper free	23.00

Freight rate to Pittsburgh or Cleveland district, \$1.89.

PITTSBURGH	
Per Gross ton, f.o.b. Pittsburgh district furnace:	
Basic	\$14.50 to \$15.50
No. 2 foundry	15.00 to 16.00
No. 3 foundry	14.50 to 15.50
Malleable	15.00 to 16.00
Bessemer	15.50 to 16.50

Freight rates to points in Pittsburgh district range from 60c. to \$1.26.

CHICAGO	
Per gross ton at Chicago furnaces:	
N't'n No. 2 fdy.	\$16.00
N't'n No. 1 fdy.	16.50
Malleable, not over 2.25 sil.	16.00
High phosphorus	16.00
Lake Super. charcoal, sil. 1.50, by rail	23.17
Southern No. 2 fdy.	\$16.14 to 17.14
Low phos., sil. 1 to 2, Copper free	24.92
Silvery, sil. 8 per cent.	24.92
Heavy ferro-sil., 15 per cent.	28.92

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnaces, not including a switching charge.

ST. LOUIS	
Per gross ton at St. Louis:	
No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	\$16.00
Del'd St. Louis	16.85
Malleable, f.o.b. Granite City	16.50
Northern No. 2 fdy., del'd St. Louis	18.30
Northern malleable, del'd	18.30
Southern fdy., sil. 1.75 to 2.25 del'd St. Louis	16.35

Freight rates \$3c. (average) Granite City to St. Louis; \$2.30 from Chicago; \$4.56 from Birmingham.

NEW YORK	
Per Gross ton, delivered New York district:	
*Buffalo, No. 2, del'd east	\$17.41
Buffalo malleable, del'd Eastern	17.91
East Pa. No. 2 fdy.	17.02
East Pa. No. 2X fdy.	17.52

Freight rates: \$1.52 to \$2.63 from eastern Pennsylvania.  
\*Prices delivered to New Jersey cities having rate of \$3.41 a ton from Buffalo.

BUFFALO	
Per gross ton, f.o.b. furnace:	
No. 2 fdy.	\$16.00
No. 2X fdy.	16.50
No. 1 fdy.	17.50
Malleable, sil. up to 2.25	16.50
Basic	15.50
Lake Superior charcoal, del'd	23.41

CINCINNATI	
Per gross ton, delivered Cincinnati:	
Ala. fdy., sil. 1.75 to 2.25	\$15.82
Ala. fdy., sil. 2.25 to 2.75	16.07
Tenn. fdy., sil. 1.75 to 2.25	15.82
N't'n No. 2 foundry	\$17.01 to 18.19
S't'n Ohio silvery, 8%	21.39

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.82 from Birmingham.

CLEVELAND	
Per gross ton at Cleveland furnace:	
N't'n No. 2 fdy.	\$15.50
Malleable	15.50
Ohio silvery, 8 per cent.	21.75
Stand. low phos., Valley	23.00
Southern No. 2 fdy.	\$16.14 to 17.14

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 63c. average local switching charge; \$3.00 from Jackson, Ohio; \$6.14 from Birmingham.

PHILADELPHIA	
Per gross ton at Philadelphia:	
East. Pa. No. 2	\$16.34
East. Pa. No. 1X	16.84
Basic (del'd east Pa.)	16.09
Malleable	16.84
Stand. low phos. (f.o.b. east Pa. furnace)	\$22.00 to \$23.00
Cop. b'r'g low phos. (f.o.b. furnace)	22.00 to 23.00
Va. No. 2	21.79
Va. No. 2X	22.29

Prices, except as specified otherwise, are del'd Philadelphia. Freight rates: \$4c. to \$1.79 from eastern Pennsylvania furnaces; \$4.67 from Virginia furnaces.

# Pig Iron, Ores, Ferroalloys

BIRMINGHAM	
Per gross ton, f.o.b. Birmingham dist. furnace:	
No. 2 fdy., 1.75 to 2.25 sil.	\$12.00
No. 2 soft, 2.25 to 2.75 sil.	12.54
Basic	12.00

NEW ENGLAND	
Per gross ton delivered to most New England points:	
Buffalo, all, 1.75 to 2.25	\$18.53 to \$19.04
Buffalo, sil. 2.25 to 2.75	18.53 to 19.04
Ala., sil. 1.75 to 2.25	18.00 to 18.50

CANADA	
Per gross ton:	
Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	\$22.60
No. 2 fdy., sil. 1.75 to 2.75	22.10
Malleable	22.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	\$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	23.00 to 23.50

Ferromanganese	
Per Gross Ton	
Domestic, 80%, seaboard	\$65.00
Foreign, 80%, Atlantic or Gulf port, duty paid	61.00

Prices for lots of one carload or more; extras applied on less than carload lots.

Spiegeleisen	
Per Gross Ton Furnace	
Domestic, 19 to 21%	\$21.00

Electric Ferroalloy	
Per Gross Ton Delivered	
50% (carloads)	\$21.50
50% (less carloads)	22.00
75% (carloads)	120.00
75% (less carloads)	130.00
4% to 16% (f.o.b.) Welland, Ont. (in carloads)	31.00
14% to 16% (less carloads)	36.00

Bessemer Ferrosilicon	
F.o.b. Jackson County, Ohio, Furnace	
Per Gross Ton	
10%	\$21.50
11%	22.00
12%	22.50
13%	23.00
Per Gross Ton	
14%	\$23.50
15%	24.00
16%	24.50

Silvery Iron	
F.o.b. Jackson County, Ohio, Furnace	
Per Gross Ton	
6%	\$19.00
7%	19.50
8%	20.00
9%	20.50
10%	21.00
11%	21.50
Per Gross Ton	
12%	\$22.00
13%	22.50
14%	23.00
15%	23.50
16%	24.00

Other Ferroalloys	
Ferrotungsten, per lb. wt. del., carloads	94c.
Ferrotungsten, less carloads	\$1.00
Ferrosilicon, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carload	9.50c.
Ferrosilicon, 5% carbon	16.50c. to 17.00c.

PITTSBURGH	
Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$11.00 to \$12.00
No. 2 heavy melting steel	9.50 to 10.00
No. 2 railroad wrought	11.50 to 12.00
Scrap rails	11.50 to 12.00
Rails 3 ft. and under	12.50 to 13.00
Sheet bar crops, ordinary	12.00 to 12.50
Compressed sheet steel	11.00 to 12.00
Hand bundled sheet steel	10.00 to 10.50
Hvy. steel axle turnings	9.50 to 10.00
Machine shop turnings	8.25 to 8.75
Short shov. steel turnings	7.00 to 7.50
Short mixed borings and turnings	7.50 to 8.00
Cast iron borings	7.50 to 8.00
Cast iron carwheels	11.00 to 11.50
Heavy breakable cast	9.00 to 9.50
No. 1 cast	10.00 to 11.00
Rail, knuckles and couplers	13.00 to 14.00
Rail, coil and leaf springs	13.00 to 14.00
Roller steel wheels	13.00 to 14.00
Low phos. billet crops	14.00 to 14.50
Low phos. sheet bar crops	13.50 to 14.00
Low phos. plate scrap	13.50 to 14.00
Low phos. punchings	13.50 to 14.00
Steel car axles	13.00 to 13.50

CHICAGO	
Delivered Chicago district consumers:	
Per Gross Ton	
Heavy melting steel	\$3.25 to \$3.75
Shoveling steel	8.25 to 8.75

Ferrosilicon, 1% carbon	\$17.50c. to 18.00c.
Ferrosilicon, 6.10% carbon	19.50c. to 20.00c.
Ferrosilicon, 0.00% carbon	20.00c. to 20.50c.
Ferrosilicon, del., per lb. contained Va.	\$2.00 to \$2.50
Ferrosilicon, 15 to 18% per net ton, f.o.b. furnace in carloads	10.00
Ferrosilicon, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn. base, per gross ton with 25 unitage	50.00
Ferrosilicon, electric, 24% f.o.b. Anniston, Ala., per gross ton with 25 unitage	50.00
Ferrosilicon, per lb. Mo., del. Caesium molybdate, per lb. Mo., del.	50.00
Silico spiegel, per ton, f.o.b. furnace, car lots	\$34.00
Tom lots or less, per ton	41.00
Silico-manganese, gross ton, delivered	50.00
2.50% carbon grade	51.00
2% carbon grade	50.00
1% carbon grade	49.00
Spot prices	\$3 a ton higher

Ores	
Lake Superior Ore, Delivered Lower Lakes Ports	
Per Gross Ton	
Old range Bessemer, 51.5% iron	\$14.00
Old range, non-Bessemer	51.50%
Iron	4.00
Mesabi Bessemer, 51.50% iron	4.00
Mesabi non-Bessemer, 51.50% iron	4.00
High phosphorus, 51.50% iron	4.00
Foreign Ore, c.i.f. Philadelphia or Baltimore	
Iron, low phos., copper free, 58% iron, dry Spanish	7.50c.
Algerian	7.50c.
Iron, low phos., Swedish, average 68% iron	7.50c.
Iron, basic or foundry, Swedish, average, 65% iron	7.50c.
Iron, basic or foundry, Russian, aver. 63% iron (nom.)	7.50c.
Manganese, Caucasian, washed 52%	18c.
Manganese, African, Indian, 50-52%	18c.
Manganese, Brazilian, 48 to 49%	18c.
Tungsten, Chinese wolframite, duty paid	\$10.00
Tungsten, domestic scheelite	\$8.00 to \$10.00
Chrome, 45%, Cr <sub>2</sub> O <sub>3</sub> , crude, c.i.f. Atlantic seaboard	14.00
Chrome, 45%, Cr <sub>2</sub> O <sub>3</sub> , c.i.f. Atlantic seaboard	12.00

\*Quotations nominal in absence of sales.

Fluorspar	
Per Net Ton	
Domestic, washed gravel 85-5, f.o.b. Kentucky and Illinois mines	\$10.50 to \$11.50
No. 2 lump, 85-5, f.o.b. Kentucky	12.50
Foreign, 85% calcium fluoride, net over 5% silicon, c.i.f. Atlantic port, duty paid	\$10.00 to 12.00
Domestic, No. 1 ground bulk, 85 to 95% calcium fluoride, net over 2% silicon, f.o.b. Illinois and Kentucky mines	20.00

# Iron and Steel Scrap

Hydraulic comp. sheets	\$7.00 to \$7.50
Drop forge flashings	0.25 to 0.75
No. 1 busheling	7.00 to 7.50
Roller carwheels	9.50 to 10.00
Railroad tires	9.50 to 10.00
Railroad leaf springs	9.50 to 10.00
Axis turnings	7.00 to 7.50
Steel couplers and knuckles	9.50 to 10.00
Coil springs	7.00 to 7.50
Axis turnings (elec. fur.)	9.50 to 10.00
Low phos. punchings	9.50 to 10.00
Low phos. plates, 12 in. and under	9.50 to 10.00
Cast iron borings	5.00 to 5.50
Short shoveling turnings	5.00 to 5.50
Machine shop turnings	5.00 to 5.50
Revolving rails	9.50 to 10.00
Steel rails, less than 3 ft.	9.50 to 10.00
Steel rails, less than 2 ft. 10.00 to 10.50	
Angle bars, steel	9.50 to 10.00
Cast iron carwheels	9.50 to 10.00
Railroad malleable	9.75 to 10.25
Agricultural malleable	7.50 to 8.00

No. 2 busheling	\$4.00 to \$4.50
Locomotive tire, smooth	1.25 to 1.75
Pipe and flue	1.25 to 1.75
No. 1 machinery cast	8.75 to 9.25
Can automobile cast	8.75 to 9.25
No. 1 railroad cast	8.50 to 9.00
No. 1 agricultural cast	8.50 to 9.00
Store plate	8.50 to 9.00
F.o.b. fur	6.75 to 7.25
Brake shoes	8.00 to 8.50

\*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

### PHILADELPHIA

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$9.00
No. 2 heavy melting steel	7.50
No. 1 railroad wrought	11.00
Bundled sheets	\$4.00 to 4.50
Hydraulic compressed, new	6.00
Hydraulic compressed, old	5.00
Machine shop turnings	5.00 to 5.50
Heavy axle turnings	7.50 to 8.00
Cast borings	3.50 to 3.75
Heavy breakable cast	8.50
Store plate (steel works)	7.00 to 7.50
No. 1 low phos. heavy	11.00 to 11.50
Couplers and knuckles	10.00 to 10.50
Roller steel wheels	10.00 to 10.50
No. 1 blast furnace	8.50 to 9.00
Spec. iron and steel pipe	8.00
Shafting	13.00 to 13.50
Steel axles	13.00 to 13.50
No. 1 force fire	5.50 to 6.00
Cast iron car wheels	9.50 to 10.00
No. 1 cast	10.00 to 10.50
Cast borings (chem.)	10.00 to 10.50
Steel rails for rolling	9.50 to 10.00

### CLEVELAND

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$9.00 to \$9.50
No. 2 heavy melting steel	8.50 to 9.00
Compressed sheet steel	9.00 to 9.50
Light bundled sheet stamp-	
ing	6.50 to 7.00
Drop forge flashings	8.00 to 8.50
Machine shop turnings	7.75 to 8.00
Short shoveling turnings	6.75 to 7.25
No. 1 busheling	7.50 to 8.00
Steel axle turnings	7.50 to 8.00
Low phos., billet crops	12.00 to 12.50
Cast iron borings	6.25 to 6.75
Mixed borings and short	
turnings	6.25 to 6.75
No. 2 busheling	6.25 to 6.50
No. 1 cast	10.00 to 10.50
Railroad grate bars	5.50 to 6.00
Store plate	5.50 to 6.00
Rails under 3 ft.	8.50 to 9.00
Rails for rolling	10.00 to 10.50
Railroad malleable	10.00 to 10.50
Cast iron car wheels	11.00

### BUFFALO

Per gross ton, f.o.b. Buffalo consumers' yards:	
No. 1 heavy melting steel	\$10.00 to \$10.50
No. 2 heavy melting steel	8.50 to 9.00
Scrap rails	8.50 to 9.00
New hydraulic, comp. sheets	8.50 to 9.00
Old hydraulic, comp. sheets	7.50 to 8.00
Drop forge flashings	8.50 to 9.00
No. 1 busheling	8.50 to 9.00
Steel axle turnings	8.50 to 9.00
Machine shop turnings	7.50 to 8.00
Knuckles and couplers	9.00 to 9.50
Coil and leaf springs	9.00 to 9.50
Roller steel wheels	9.00 to 9.50
Low phos. billet crops	12.00 to 12.50
Short shov. steel turnings	6.50 to 7.00
Short mixed borings and	
turnings	4.50 to 5.00
Cast iron borings	3.75 to 4.25
No. 2 busheling	3.50 to 4.00
Steel car axles	10.00 to 11.00
Iron axles	10.00 to 11.00
No. 1 machinery cast	10.50 to 11.00
No. 1 cupola cast	9.00 to 9.50
Store plate	7.50 to 8.00
Steel rails, 3 ft. and under	11.50 to 12.00
Cast iron car wheels	8.00 to 8.50
Industrial malleable	7.00 to 7.50
Railroad malleable	9.50 to 10.00
Chemical borings	7.50 to 8.00

### BIRMINGHAM

Per gross ton delivered consumers' yards:	
Heavy melting steel	\$8.00 to \$8.50
Scrap steel rails	7.50
Short shoveling turnings	7.00
Store plate	6.00
Steel axles	10.00
Iron axles	10.50
Rails for rolling	5.00
No. 1 cast	8.00 to 8.50
Tramcar wheels	8.00
Cast iron borings, chem.	8.00

### ST. LOUIS

Per gross ton delivered consumers' yards:	
Selected heavy steel	\$8.00 to \$8.50
No. 1 heavy melting	8.00 to 8.50
No. 2 heavy melting	7.50 to 8.00
Mix. locomotive tires	6.00 to 6.50
Railroad springs	8.50 to 9.00
Bundled sheets	9.00 to 9.50
No. 2 railroad wrought	8.00 to 8.50
No. 1 busheling	8.50 to 9.00
Cast iron borings and	
shoveling turnings	2.50 to 3.00
Rails for rolling	9.50 to 10.00
Machine shop turnings	2.50 to 3.00
Heavy turnings	4.00 to 4.50
Steel car axles	9.50 to 10.00
Iron car axles	11.00 to 11.50
Wrought iron bars and trans.	7.00 to 7.50
No. 1 railroad wrought	5.50 to 6.00
Steel rails less than 3 ft.	10.00 to 10.50
Steel angle bars	8.50 to 9.00
Cast iron car wheels	6.75 to 7.25
No. 1 machinery cast	7.00 to 7.50
Railroad malleable	7.50 to 8.00
No. 1 railroad cast	6.25 to 6.75
Store plate	6.50 to 7.00
Relay rails, 60 lb.	
under	10.00 to 10.50

Relay rails, 60 lb. and over \$20.00 to \$21.00  
Agricult. malleable 4.00 to 4.50

### BOSTON

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel	\$5.25 to \$5.50
Scrap T rails	5.00 to 5.50
Machine shop turnings	2.00 to 2.25
Cast iron borings	2.00 to 2.25
Bundled skeleton, long	3.25 to 3.50
Forge flashings	2.50 to 3.75
Shafting	7.50 to 8.00
Steel car axles	7.50 to 8.00
Wrought pipe	2.50 to 2.75
Rails for rolling	6.00 to 6.50
Cast iron borings, chemical	7.25 to 7.75

Per gross ton delivered consumers' yards:  
Textile cast \$6.50 to \$7.00  
No. 1 machinery cast 6.50 to 7.00  
Store plate 4.25 to 4.50  
Railroad malleable 8.50 to 9.50

### NEW YORK

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel	\$5.50 to \$6.00
No. 2 heavy melting steel	4.50 to 5.00
Heavy melting steel (yard)	2.50 to 3.00
No. 1 heavy breakable cast	5.00 to 5.50
Store plate (steel works)	3.00 to 3.25
Machine shop turnings	2.50 to 3.00
Short shoveling turnings	2.50 to 3.00
Cast borings	2.50 to 3.00
No. 1 blast furnace	3.00 to 3.50
Steel car axles	9.50 to 10.00

### PITTSBURGH

Base per lb.	
Plates	2.85c
Structural shapes	2.85c
Soft steel bars and small shapes	2.60c
Reinforcing steel bars	2.60c
Cold-finished and screw stock	
Rounds and hexagons	2.95c
Squares and flats	2.95c
Hoops and bands, under 1/2 in.	2.95c
Hot-rolled annealed sheets (No. 24)	
25 or more bundles	3.10c
Galv. sheets (No. 24), 25 or more	
bundles	3.60c
Hot-rolled sheets (No. 10) 2.60c to 2.90c	
Galv. corrug. sheets (No. 24), per square (less than 2750 lb.)	\$9.61
Spikes, large	2.40c
Small	2.65c
Boat	2.90c
Track bolts, all sizes, per 100 count	
70 per cent off list	
Machine bolts, 100 count	
70 per cent off list	
Nuts, all styles, 100 count	
70 per cent off list	
Large rivets, base per 100 lb.	\$3.00
Wire, black, soft ann'd, base per 100 lb.	2.65
Wire, galv. soft, base per 100 lb.	3.10
Common wire nails, per keg	2.20
Cement coated nails, per keg	2.30

On plates, structural, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

### CHICAGO

Base per lb.	
Plates and structural shapes	3.00c
Soft steel bars	2.75c
Reinforce. bars, billet steel 1.55c to 1.70c	
Rail steel reinforcement	1.50c to 1.45c
Flat-in. steel bars and shafting	
Rounds and hexagons	3.00c
Flats and squares	3.50c
Bands, 3/16 in. (in Nos. 10 and 12 sizes)	2.95c
Hoops (No. 14 sage and lighter)	3.50c
Hot-rolled annealed sheets (No. 24)	2.45c
Galv. sheets (No. 24)	3.85c
Hot-rolled sheets (No. 10)	2.75c
Spikes (3/16 in. and lighter)	3.45c
Track bolts	4.30c
Rivets, structural (keg lots)	2.75c
Rivets, boiler (keg lots)	2.75c
Per Cent Off List	
Machine bolts	65
Carriage bolts	65
Coach and lag screws	65
Hot-pressed nuts, sq., tap. or blank	65
Hot-pressed nuts, hex., tap. or blank	65
Hex. head cap screws	50 and 10
Cup point set screws	75
Flat head bright wood screws	50 and 10
Spring cotters	60 and 10
Store bolts	80
Rd. hd. tank rivets, 7/16 in. and smaller	65
Wrought washers	\$4.50 off list
No. 8 black ann'd wire, per 100 lb.	\$3.45
Com. wire nails, base per keg	2.90
Cement c'd nails, base per keg	2.90

### NEW YORK

Base per lb.	
Plates and struc. shapes	3.10c
Soft steel bars, small shapes	3.10c
Iron bars	3.24c
Iron bars, swed. charcoal	5.75c to 6.25c
Cold-fn. shafting and screw stock	
Rounds and hexagons	3.54c
Flats and squares	4.64c
Cold-rl. strip, soft and quarter hard	4.95c
Hoops	5.30c
Bands	5.30c
Hot-rolled sheets (No. 10)	2.60c
Hot-rolled ann'd sheets (No. 24)	3.25c
Galvanized sheets (No. 24)	3.50c
Long term sheets (No. 24)	4.50c
Standard tool steel	12.00c
Wire, black annealed (No. 10)	3.00c
Wire, galv. annealed (No. 10)	4.05c
Wire, steel 1/2 in. and larger	3.40c
Smooth finish, 1 to 2 1/2 x 1/4 in. and larger	9.75c

Spec. iron and steel pipe	\$3.00 to \$3.25
Forge fire	2.75 to 3.00
No. 1 railroad wrought	5.00 to 5.50
No. 1 yard wrought long	3.50 to 3.75
Rails for rolling	5.50 to 6.00
No. 1 cast	5.50 to 5.75
No. 2 cast	4.50 to 4.75
Store plate (foundry)	4.50 to 5.00
Cast borings (chemical)	6.00 to 6.50

Per gross ton, delivered local foundries:  
No. 1 machinery cast \$9.00  
No. 1 hv. cast (cupola size) 7.50 to 8.00  
No. 2 cast 5.00 to 5.50

### CINCINNATI

Dealers' buying prices per gross ton:	
Heavy melting steel	\$7.25 to \$7.75
Scrap rails for melting	7.25 to 7.75
Loose sheet clippings	1.75 to 2.25
Bundled sheets	4.25 to 4.75
Cast iron borings	3.50 to 4.00
Machine shop turnings	3.25 to 3.75
No. 1 busheling	4.50 to 5.00
No. 2 busheling	2.75 to 3.25
Rails for rolling	7.75 to 8.25
No. 1 locomotive tires	7.25 to 7.75
Short rails	10.00 to 10.50
Cast iron car wheels	7.25 to 7.75
No. 1 machinery cast	6.75 to 7.25
Store plate	6.25 to 6.75
Burnt cast	4.50 to 5.00
Store plate	4.50 to 5.00
Agricultural malleable	7.75 to 8.25
Railroad malleable	8.00 to 8.50

## Warehouse Prices for Steel Products

Open hearth spring steel, bases	
4.50c to 7.00c	
Common wire nails, base, per keg	\$2.65
Machine bolt, cut thread:	
3/4 x 6 in. and smaller .65 to .65 and 10	
1 x 80 in. and smaller .65 to .65 and 10	
Carriage bolt, cut thread:	
3/4 x 6 in. and smaller .65 to .65 and 10	
1 x 20 in. and smaller .65 to .65 and 10	
Boiler tubes:	
Lap welded, 2-in. Per 100 ft.	\$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	63.65

\*No. 28 and lighter, 36 in. wide, 20c higher per 100 lb.

### ST. LOUIS

Base per lb.	
Plates and struc. shapes	3.25c
Bars, steel or iron	3.00c
Cold-fn. rounds, shafting, screw stock	3.30c
Hot-rolled annealed sheets (No. 24)	3.70c
Galv. sheets (No. 24)	4.00c
Hot-rolled sheets (No. 10) up to and incl. 48 in. wide	2.60c
over 48 in. wide	3.15c
Black corrug. sheets (No. 24)	3.75c
Galv. corrug. sheets	4.05c
Structural rivets	4.00c
Boiler rivets	4.00c
Off List	
Tank rivets, 7/16 in. and smaller	
100 lb. or more	65
Less than 100 lb.	60
Machine bolts	65
Carriage bolts	65
Lag screws	65
Hot-pressed nuts, sq. blank or tapped, 200 lb. or more	65
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	55
Less than 200 lb.	65

### PHILADELPHIA

Base per lb.	
*Plates, 1/2 in. and heavier	2.45c
*Structural shapes	2.45c
*Soft steel bars, small shapes, iron bars (except bands)	2.45c
Reinforce. steel bars, sq., twisted and deform.	2.30c
Cold-finished steel bars	3.35c
*Steel hoops	3.00c
*Steel bands, No. 12 to 3/16 in. incl.	2.75c
Spring steel	3.00c
*Hot-rolled annealed sheets (No. 24)	3.15c
*Galvanized sheets (No. 24)	3.50c
*Hot-rolled annealed sheets (No. 10)	2.70c
Diam. nat. floor plates, 1/2 in.	2.00c
Swedish iron bars	5.60c

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.  
\*Base prices subject to deductions on orders aggregating 4000 lb. or over.  
†For 50 bundles or over.

### CLEVELAND

Base per lb.	
Plates and struc. shapes	2.95c
Soft steel bars	2.75c
Reinforce. steel bars	1.75c to 2.25c
Cold-fn. steel bars	2.95c
Flat rolled steel under 1/2 in.	3.00c
Cold-finished strip	5.55c
Hot-rolled annealed sheets (No. 24)	2.95c
Galvanized sheets (No. 24)	3.50c
Hot-rolled sheets (No. 10)	2.60c
Black ann'd wire, per 100 lb.	\$2.55
No. 9 galv. wire, per 100 lb.	2.90
Com. wire nails, base per keg	2.10

\*Net base, including boring and cutting to length.

### CINCINNATI

Base per lb.	
Plates and struc. shapes	3.25c
Bars, soft steel or iron	3.00c
New billet reinforce. bars	3.00c
Rail steel reinforce. bars	3.00c
Hoops	3.90c
Bands	3.90c
Cold-fn. rounds and hex.	3.32c

### DETROIT

Dealers' buying prices per gross ton:	
Hvy. melting steel	\$7.25 to \$7.75
Borings and short turnings	4.50 to 5.00
Low turnings	4.50 to 5.00
No. 1 machinery cast	8.00 to 8.50
Automotive cast	10.00 to 10.50
Hydraulic, comp. sheets	7.25 to 7.75
Store plate	4.00 to 4.50
New No. 1 busheling	6.00 to 6.50
Old No. 2 busheling	4.00 to 4.50
Sheet clippings	3.25 to 3.75
Flashings	5.00 to 5.50

### CANADA

Dealers' buying prices per gross ton:	
Toronto Montreal	
Heavy melting steel	\$4.50 \$4.50
Rails, wrap	4.50 4.50
Machine shop turnings	2.00 2.00
Boiler plate	4.50 4.50
Heavy axle turnings	2.50 2.50
Cast borings	2.00 2.00
Steel borings	2.00 2.00
Wrought pipe	2.50 2.50
Steel axles	4.50 6.00
Axles, wrought iron	4.50 6.50
No. 1 machinery cast	7.75 9.00
Store plate	4.50 5.00
Standard car wheels	7.25 7.00
Malleable	6.75 7.00

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# PLANT EXPANSION AND EQUIPMENT BUYING

## ◀ NORTH ATLANTIC ▶

**Edward & John Burke, Ltd.**, 47-24 Twenty-seventh Street, Long Island City, brewer, with main plants at Dublin, Ireland, and London, England, has acquired property, 246 x 356 ft., on block bounded by Skillman and Nelson Avenues, Twenty-seventh and Twenty-eighth Streets, for new six-story bottling plant, with mechanical-cooling and storage and distributing departments. Cost over \$150,000 with machinery.

**New York Central Railroad**, 466 Lexington Avenue, New York, W. C. Bower, vice-president in charge of purchases and stores, asks bids until May 29 for steel rails, splice bars, etc. (Serial Contract No. 4-1933).

**Peter Doelger Brewing Corp.**, 84 Forrest Street, Brooklyn, is considering addition to brewing plant at Amsterdam Avenue and 128th Street, New York, where main brewery will be located. Cost over \$60,000 with equipment.

**Robinson, Reeks & Co., Inc.**, New York, has been organized by Lawrence A. Robinson, 296 East Sidney Avenue, Mount Vernon, N. Y., and William A. Reeks, 8 Clove Road, Upper Montclair, N. J., to manufacture mechanical blowers, exhaust fans and kindred equipment.

**Great Atlantic & Pacific Tea Co.**, 420 Lexington Avenue, New York, plans two-story storage and distributing plant, 100 x 160 ft., at Tarrytown, N. Y. Cost over \$50,000 with mechanical-handling and other equipment.

**Cullen Blade & Razor Co., Inc.**, New York, has been organized by Patrick J. Cullen, 343 Weir Avenue, Lyndhurst, N. J., and Max Birk, 485 South Twenty-first Street, Irvington, Newark, N. J., to manufacture safety razors, blades, etc.

**Liberty Brewing Co.**, 190 Beach Eighty-second Street, Rockaway Beach, L. I., operating Liberty Bottling Works, same address, is considering extensions and improvements, including new equipment. Cost close to \$250,000 with machinery.

**Horton Pilsner Brewing Co., Inc.**, 460 West 128th Street, New York, recently merged with United Refrigeration & Terminals Co., Inc., same address, is carrying out a remodeling and expansion program, to develop a capacity of 100,000 cases a week.

**Dieter Bearings Corp.**, New York, has been organized, capital \$300,000, by Paul W. Dieter, 24 Fifth Avenue, and Charles Clees, Jr., 25 Church Street, to manufacture ball bearings, roller bearings and kindred products.

**New Jersey Foundry & Machine Co.**, Harrison, N. J., has leased one-story building at 300 Bergen Avenue, for production of brass, bronze, aluminum and other metal castings.

**J. Steinberg & Sons**, 740 Frelinghuysen Avenue, Newark, N. J., manufacturer of metal beer cooler tanks and kindred metal products, has advanced output to capacity, with full working force.

**McNeill Cooperage Co.**, Broad Street, Phillipsburg, N. J., manufacturer of wire-bound barrels, kegs, etc., plans rebuilding two-story plant unit recently destroyed by fire, 50 x 70 ft. Headquarters are at main plant, Rahway, N. J.

**Seamless Tube & Reel Co.**, West Paterson, N. J., has been organized by Joseph Hartman and associates, to take over Seamless Tube Co., with local plant at 80 Glover Avenue, and will expand operations.

**Great Eastern Breweries, Inc.**, 92-94 Main Street, Manville, N. J., has plans for six-story plant with two two-story wing additions, power plant, and one-story mechanical unit, at East Manville, where property has been purchased. Work is scheduled to begin late in June. Cost over \$350,000 with equipment. B. Sumner Gruzen, 972 Madison Avenue, New York, is architect. Company was organized recently with capital of \$500,000 by George E. Halliday, formerly general manager, Johns-Manville Corp. plant, who will be president of Great Eastern company. C. J. Kupper, 409 East Main Street, Bound Brook, N. J., is a company official and engineer.

**Eclipse Metal Stamping Co.**, Philadelphia, recently organized, has leased floor in building at Race and Van Pelt Streets for new plant.

**City Park Brewing Co.**, Twenty-ninth and Parrish Streets, Philadelphia, has approved plans for extensions and improvements. Cost about \$50,000 with equipment. William F. Koelle & Co., 1633 Race Street, are engineers.

**Bureau of Supplies and Accounts**, Navy Department, Washington, asks bids until May 31 for one direct motor-driven forced draft blower (Schedule 141) for Philadelphia Navy Yard.

**J. G. Brill Co.**, Philadelphia, manufacturer of railroad cars, trucks, etc., is advancing production schedule. Company recently secured contract for five trackless trolley buses for Dayton Street Railway Co., Dayton, Ohio, totaling about \$60,000.

**Borough Council**, Shippensburg, Pa., plans installation of pumping machinery and auxiliary equipment, pipe lines, etc., for extensions in municipal waterworks. A bond issue of \$130,000 is being arranged.

**John F. Betz & Son, Ltd.**, 415 Callowhill Street, Philadelphia, has approved plans for extensions and improvements in brewery, including additional equipment. Cost over \$45,000 with machinery.

**Consolidated Aircraft Corp.**, 2050 Elmwood Avenue, Buffalo, manufacturer of airplanes and parts, has arranged with City Commission, Long Beach, Cal., for lease of 30-acre tract near Long Beach municipal airport. Plans are being considered for branch plant for production of seaplanes in addition to regular aircraft. Cost over \$200,000 with equipment.

**R. E. Chapin Mfg. Works**, Batavia, N. Y., manufacturer of steel barrels, tanks, etc., has resumed operations after period of curtailment.

**Sikes-Cutler Desk Co.**, 20 Churchill Street, Buffalo, manufacturer of metal and other office furniture and equipment, and Sikes Chair Co., 500 Clinton Street, affiliated, have arranged for merger with Sikes Co., Philadelphia, manufacturer of similar equipment. Last noted plant will be removed to Buffalo, where production will be increased and concentrated.

**Independent Galvanizing Co., Inc.**, 39 Verona Avenue, Newark, N. J., has purchased former plant of Newark Galvanizing Co. of same address. Charles V. Mayer, is president; Theodore Hayes, vice-president.

## ◀ SOUTH ATLANTIC ▶

**Monumental Brewery Co.**, Lombard Street near Eighth Street, Baltimore, plans early purchase of equipment for output of about 100,000 bbl. a year. Plans have been approved for extensions and improvements to cost about \$50,000. F. C. Streett Engineering Co., 17 East Saratoga Street, is engineer in charge.

**Appleton Co.**, Anderson, S. C., plans installation of steam turbine unit, boilers, pumping and other equipment for expansion and improvements in steam power plant at cotton mill. Cost about \$175,000 with equipment. J. E. Sirrine & Co., Greenville, S. C., is consulting engineer.

**Crown Cork & Seal Co.**, 4401-25 Eastern Avenue, Baltimore, manufacturer of metal bottle caps, sealing machinery, etc., has plans for one-story valve and tank house, to include 25,000-gal. steel tank. Cost about \$25,000 with equipment.

**General Purchasing Officer**, Panama Canal, Washington, asks bids until June 2 for wire rope, brass and copper pipe, insulated cable, wire, stainless steel plates, steel rods, meter-testing blocks, switches, carwheel brake shoes, chain hoists, metal garbage cans, electric water heaters, wire nails, panelboards, etc. (Schedule 2872).

**Keystone Valve & Mfg. Corp.**, Highfield, Md., has been organized by Omer T. Kayler, Hagerstown, Md., and Harvey C. Bridges, Blue Ridge Summit, Pa., to manufacture valves and other engineering specialties.

**Procurement Division**, Veterans' Administration, Washington, asks bids until May 29 for one motor-driven power hacksaw (Proposal 511-M), two key-cutting machines (Proposal 495-M), hand trucks (Proposal 459-M), one wheel type tractor (Proposal 515-M).

**Carolina Brewing Co.**, Columbia, S. C., recently organized by Richard I. Lane and O. Lee Gordon, Columbia, with capital of \$500,000, plans new brewery. Cost over \$300,000 with equipment.

**Bureau of Supplies and Accounts**, Navy Department, Washington, asks bids until May 31 for steel tubes (Schedule 86) for Boston, Brooklyn, Philadelphia and Puget Sound Navy yards; aluminum lockers and furniture (Schedule 130) for Boston yard; motor-driven pumps and spare parts, gland exhausters (Schedule

88), drainators for piping system and spare parts (Schedule 73), main reduction gears and spare parts (Schedule 78), dies, die-stocks, taps and tap wrenches (Schedule 80), shaft revolution indicator systems (Schedule 15), nippers and pliers (Schedule 116), 138 chain hoists (Schedule 113), machinists' chisels, chisel blanks and pneumatic chisels (Schedule 89), screw drivers (Schedule 101), clamps and punches (Schedule 109), 2400 lb. corrosion resisting sheet steel (Schedule 103), rules and tapes (Schedule 115), vises (Schedule 114), ratchet braces and breast drills (Schedule 105), wood-boring bits, chisels and knives (Schedule 91), 28,000 lb. plate steel (Schedule 87), eight electric-operated fuel oil pumps (Schedule 112) for Eastern and Western yards.

## ◀ NEW ENGLAND ▶

**Foster, Merriam & Co.**, Meriden, Conn., manufacturer of metal castings, plans rebuilding foundry unit damaged by fire May 14. Loss over \$25,000 with equipment.

**American Scientific Instrument Co.**, Milford, Conn., has been organized by F. O. and Charles F. Hindle, 13 West Main Street, capital \$50,000, to manufacture precision instruments and parts.

**J. B. Williams Co.**, Glastonbury, Conn., manufacturer of soaps, has approved plans for one-story branch plant at Ville LaSalle, Montreal, to be operated by J. B. Williams Co., Ltd., of Canada, a subsidiary. Cost about \$50,000 with machinery.

**Cremo Brewery Co.**, Belden Street, New Britain, Conn., has filed plans for extensions and improvements, including additional equipment. Cost about \$35,000.

**Bureau of Supplies and Accounts**, Navy Department, Washington, asks bids until May 31 for 7000 wire guards (Schedule 68); 7000 hand portables, without guards (Schedule 69) for Portsmouth, N. H., Navy Yard; 65,000 lb. steel welding electrodes (Schedule 146) for Boston yard.

**Domestic Appliance Corp.**, Waterbury, Conn., has been organized by A. G. and J. G. Baril, 59 Piedmont Street, to manufacture electrical equipment and devices.

**Day Mfg. Co.**, Clinton, Conn., plant has been sold to M. H. Young, Springfield, Mass., who will manufacture screw drivers and other builders' tools under name of M. H. Young, Inc.

**Middletown Mfg. Co.**, Middletown, Conn., has been organized to manufacture automobile tank caps, other automobile accessories and household specialties in former Westinghouse plant on William Street.

## ◀ CENTRAL DISTRICT ▶

**Oil Well Supply Co.**, Clark Building, Pittsburgh, Pa., manufacturer of oil well drilling equipment and supplies, has plans for extensions and improvements in rod division at Imperial Works, Oil City, Pa., including new equipment. Cost over \$50,000.

**Mohawk Mining Co.**, Kittanning, Pa., plans rebuilding tippie at mining properties in Applewold Borough, near city, recently destroyed by fire. Loss about \$75,000 with equipment.

**American Brewery Co.**, Altoona, Pa., has approved plans for extensions and improvements, including additional equipment. Cost over \$60,000 with machinery.

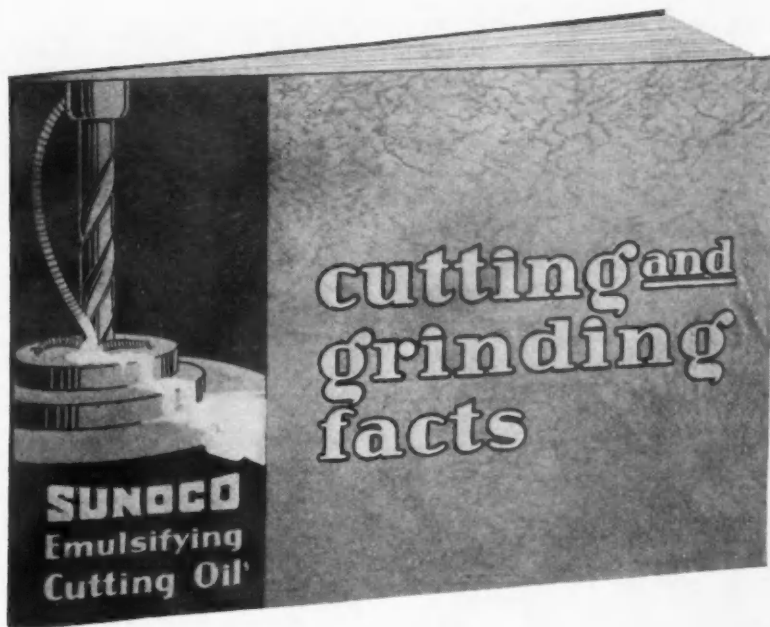
**Simplex Battery Co.**, New Castle, Pa., E. D. Hawk, general manager, manufacturer of electric storage batteries and parts, has plans for rebuilding plant destroyed by fire a few weeks ago, to be one-story, 100 x 100 ft. Cost about \$50,000 with equipment.

**Christ Riehl Brewing Co.**, Defiance, Ohio, has awarded general contract to Baker & Shindler Co., Defiance, for two-story stock house, storage and distributing plant. Cost about \$75,000 with equipment.

**Department of Public Utilities**, City Hall, Cleveland, will soon begin waterworks expansion and improvements in Parma district, including pumping plant, pipe lines, reservoir, etc. Cost about \$4,000,000.

**Buckeye Rolling Mill Co.**, Newark, Ohio, has been organized by Gordon D. Kinder, Martins Ferry, Ohio, and associates, to operate a plant at first noted place, with capital of \$50,000.

**Sohn Brewing Co.**, Cincinnati, operating former plant of Lackman Brewery Co., 819



## To the Metal Cutting Industry—

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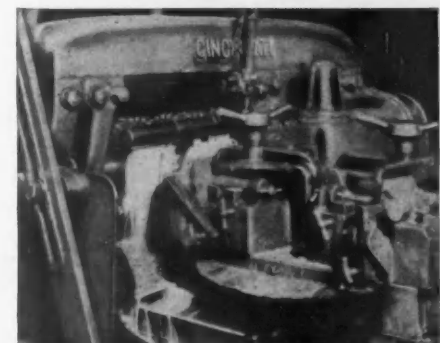
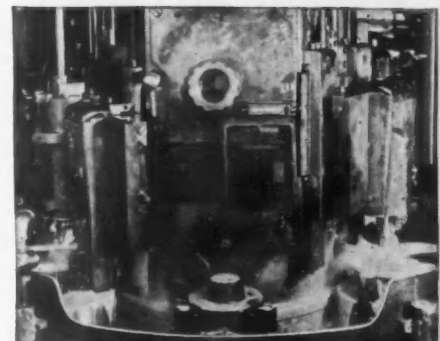
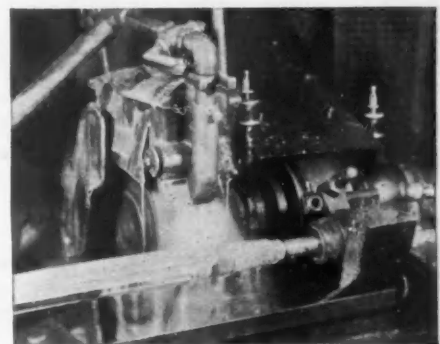
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West Sixth Street, has plans for expansion and improvements, including additional equipment. Company has arranged for stock issue totaling about \$1,000,000, a considerable part of proceeds to be used for work.

**General Motors Corp.**, Detroit, has acquired Sunlight Electrical Mfg. Co., Warren, Ohio, manufacturer of fractional horsepower motors and parts, and will operate under direction of Delco Products Corp., Dayton, Ohio, a subsidiary. Plant will be continued at Warren for present line of output and developed to capacity.

**Franklin Brewery Co.**, Columbus, Ohio, headed by John Unvergast, 440 South Eighth Street, president, has plans for new brewery. Cost over \$135,000 with equipment.

**Corps Area Quartermaster**, Fort Hayes, Columbus, Ohio, asks bids until May 31 for one pipe-cutting and threading machine and one concrete-mixing machine (Circular 3).

**Crosley Radio Corp.**, 1329 Arlington Street, Cincinnati, has established capacity 24-hr. three-shift day schedule at electric refrigerator manufacturing works, giving employment to 500 persons.

**Contracting Officer, Material Division**, Wright Field, Dayton, Ohio, asks bids until May 29 for switches, regulators, transformers, etc. (Circular 638), 30,000 ignition wire radio shielding equipment (Circular 631); until May 31, 143 oil temperature assemblies and six oil regulator assemblies (Circular 601), 8075 ball bearings, 400 bearing assemblies, and 525 aircraft ball bearings (Circular 593), 13 air-cooled compressors (Circular 589), 2000 sets airplane mooring harpoons (Circular 596), two motor-driven surface grinders (Circular 622), trailers (Circular 549), three motor-driven tool and cutter grinders (Circular 623), 1000 switch assemblies (Circular 640), 57 steel racks and four sets steel shelving (Circular 624).

**Automatic Tool Co.**, Richmond, Ind., manufacturer of multiple drills and other tools, has adopted night-shift schedule in addition to full time day operation, with increased working force.

**Western Corp.**, Elkhart, Ind., has been organized by William R. Riblet and William H. Warford, Elkhart, to manufacture mechanical-handling equipment and devices for coal, coke and similar materials.

**Schmidt Brewing Co.**, Chicago, care of George L. Lehle, 502 Aldine Avenue, Chicago, architect, has plans for two-story and basement storage and distributing plant at Logansport, Ind. Cost about \$40,000 with equipment.

**City Council**, Munising, Mich., has engaged Alvord, Burdick & Howson, 20 North Wacker Drive, Chicago, consulting engineers, to draw plans for municipal electric light and power plant. Cost over \$90,000 with equipment.

**Stanley Steel Co.**, 434 East Milwaukee Avenue, Detroit, has been organized by Harlan W. Stanley, 1068 Bedford Road, Grosse Pointe, and associates, to operate local iron and steel works.

**Kelvinator Corp.**, 14250 Plymouth Street, Detroit, manufacturer of electric refrigerators, parts, etc., has developed new type of oil burner and will soon arrange extensive production.

## ◀ MIDDLE WEST ▶

**Milwaukee Road**, Union Station, Chicago, has filed plans for one-story engine house, 90 x 200 ft., with repair facilities, at Chicago. Cost over \$45,000 with equipment.

**Mutual Ice & Beverage Co.**, Twenty-second Street and Turner Avenue, Chicago, operating former plant of Mutual Brewing Co., has asked bids, extensions and improvements. Additional equipment will be installed. Cost about \$75,000 with machinery.

**Bamax Machine Co.**, 819 Elm Street, Rockford, Ill., has been organized by Bay and Homer E. St. John, and Max E. Dayton, Rockford, to manufacture machinery and parts.

**Roaring Fork Electric Light & Power Co.**, Aspen, Colo., plans transmission line to Twin Lakes district, about 21 miles. Cost \$35,000 with equipment. Durbin Van Law, C. A. Johnson Building, Denver, is consulting engineer.

**Rath Packing Co.**, Sycamore and Elm Streets, Waterloo, Iowa, meat packer, let general contract to H. A. Maine Co., Marsh Place Building, for five-story and basement addition, 60 x 100 ft. Cost about \$60,000 with equipment. H. Peter Henschien, 59 East Van Buren Street, Chicago, is architect and engineer.

**Fountain City Ornamental Iron Co.**, Minneapolis, has purchased plant occupied under lease from General Bronze Corp., Long Island City, N. Y., which originally acquired plant

from Fountain City company. Last noted company will develop plant for sole occupancy.

**City Council**, Winfield, Iowa, has called special election on June 14 to approve plans and bonds for \$66,000 for municipal electric light and power plant. Young & Stanley, Inc., Muscatine, Iowa, is consulting engineer.

**Southern Malleable Iron Co.**, East St. Louis, Ill., has advanced production schedule, with day and night shifts. Employment has been increased about 35 per cent during past few weeks.

**Griggs Power & Light Co.**, Big Piney, Wyo., has plans for new electric light and power plant. Cost over \$70,000 with machinery.

**Oil Safety Signal Co.**, 1117 Wabash Avenue, has been organized by Clayton Rathman and Walter B. Rae, to manufacture signal equipment and devices.

## ◀ SOUTH CENTRAL ▶

**Folz Brewing Co., Inc.**, New Orleans, now being organized by M. G. Gelpi, 1226 North Lopez Street, and associates, plans erection of new plant. Cost over \$100,000 with equipment.

**Union Brewing Co.**, Press Street, New Orleans, La., let general contract to O. M. Gwin Construction Co., Inc., 3501 Fern Street, for one-story addition. Cost over \$50,000 with equipment. Wogan & Bernard, Canal Bank Building, are architects.

**Goodyear Tire & Rubber Co.**, Gadsden, Ala., has increased production schedule to three-shift day basis, with employment of normal working force.

**Falls City Ice & Beverage Co.**, Broadway and Thirty-first Street, Louisville, has authorized erection by day labor of one-story machine shop, 80 x 105 ft. Cost about \$35,000 with equipment. C. W. Wagner is company engineer.

**Frank Fehr Brewing Co.**, Fehr Street, Louisville, has arranged for preferred stock issue to total over \$500,000, of which about \$200,000 will be used for expansion and improvements, recently begun, including equipment. Freyn Engineering Co., 310 South Michigan Avenue, Chicago, is architect and engineer.

**Common Council**, Gretna, La., has called special election June 13 to approve bonds for \$210,000 for municipal waterworks, including pumping machinery, pipe lines, etc. Swanson-McGraw, Inc., Balter Building, New Orleans, is engineer.

## ◀ PACIFIC COAST ▶

**West Coast Brewing Co.**, 819 South Figueroa Street, Los Angeles, recently organized, has acquired building in Central Manufacturing District, Vernon, for plant. Cost about \$45,000 with equipment. Harry J. Coffman is manager.

**Great Western Electro-Chemical Co.**, 9 Main Street, San Francisco, manufacturer of industrial chemicals, has plans for one-story addition to plant at Pittsburg, Cal., 80 x 120 ft., for storage and distribution. Cost about \$35,000 with equipment. Leland Rosener, 233 Sansome Street, San Francisco, is architect.

**Bureau of Supplies and Accounts**, Navy Department, Washington, asks bids until June 6 for boiler tube cleaning outfits (Schedule 152), corrosion resisting sheet steel (Schedule 144) for Mare Island Navy Yard.

**Astronomical Devices, Inc.**, Los Angeles, has been organized by Edward Rose and George W. Bassett, 2080 Mound Street, to manufacture precision equipment and devices.

**Superheat Boilers, Inc.**, 275 Pine Street, Portland, Ore., William E. Russell, general manager, manufacturer of boilers and boiler equipment, is considering new one-story plant. Cost over \$30,000 with equipment.

**Columbia Brewing Co.**, 2120 South C Street, Tacoma, Wash., is planning expansion and improvements, with erection of new one-story brew-house and boiler plant. Cost about \$80,000 with equipment. Elmer E. Hemrich is president and general manager.

**Consolidated Brewing Co.**, foot of Thirty-second Street, San Diego, has plans for extensions and improvements, including equipment. Company is arranging financing for work, to cost over \$75,000 with machinery. J. H. Zitt is president.

**Borden's Farm Products Co., Ltd.**, 1045 Wall Street, Los Angeles, is considering two-story milk products plant at Stockton, Cal., 100 x 150 ft. Cost about \$150,000 with tanks, conveyors, dairy machinery and other equipment. R. B. Parker is manager at Stockton.

**Industrial X-Ray Corp.**, Chamber of Commerce Building, Los Angeles, recently men-

tioned in these columns, was organized by Andrew Lucas, Los Angeles, to manufacture and distribute in United States Philips Metalix portable X-ray apparatus, developed by N. V. Philips Gloeilampenfabrieken, Eindhoven, Holland.

**Schmidt Brewing Co.**, Los Angeles, has plans for new brewery. Cost about \$400,000 with equipment. Gay Engineering Corp., 2650 Santa Fe Avenue, will have charge of construction.

## ◀ SOUTHWEST ▶

**City Council**, Burlington, Kan., has called special election June 1 to approve bonds for \$118,000 for municipal electric light and power plant, to cost \$85,000 with equipment, and electrical distributing system, \$33,000. E. T. Archer & Co., New England Building, Kansas City, Mo., are consulting engineers.

**Tulsa Winch Mfg. Co.**, Tulsa, Okla., has been organized by Ralph Bates and Harley L. Pray, 1766 South Wheeling Street, to manufacture winches and kindred equipment.

**Common Council**, Desarc, Ark., plans installation of pumping machinery, pipe lines, etc., for municipal water and sewage systems. Cost about \$75,000 and financing in that amount is being arranged. James H. Rice, 902 Marshall Street, Little Rock, Ark., is engineer.

**Constructing Quartermaster**, Fort Leavenworth, Leavenworth, Kan., asks bids until June 8 for a gasoline fueling system.

**Wurzbarger Brewing Co., Inc.**, Kansas City, Mo., recently organized by George Wurzbarger and P. Martin Steinkamp, Walltower Building, has purchased property at North Kansas City for new plant, and will soon have plans drawn. Cost over \$85,000 with equipment.

**Water and Light Department**, McPherson, Kan., plans installation of 250,000-gal. steel tank on 110-ft. elevated steel tower, booster pumping machinery and auxiliaries, for waterworks extensions and improvements.

**Milwaukee Brewing Co.**, 814 Ninth Avenue, Fort Worth, Tex., recently organized to succeed to Milwaukee Bottling Works, same address, plans three-story addition for brewery. Cost over \$100,000 with equipment. Frederick Schroeder is president.

**Southern Pacific Co.**, Houston, Tex., plans installation of power plant for central heating service, pumping plant, machine shop and other units for new local terminal. Fund of \$1,200,000 has been arranged for structures.

**Galveston Harbor Terminal Co.**, Texas City, Tex., recently organized by Freeman W. Burford, Tower Petroleum Building, Dallas, Tex., and associates, has approved plans for oil storage and distributing terminal at first noted place. Project will include a pumping plant. Cost about \$85,000.

## ◀ FOREIGN ▶

**Cerveceria Cuauhtemoc, Ltd.**, Monterey City, State of Nuevo Leon, Mexico, brewer, is arranging bond issue of 2,500,000 pesos (about \$725,000), proceeds to be used in part for expansion. Company is considering new branch plant in southern California, near Mexico boundary line, to cost over \$400,000 with machinery.

**Department of Posts and Telegraph**, Melbourne, Australia, asks bids until June 29 for multiple cable for line service.

**Division of Public Works**, Kingston, Jamaica, is planning Government-owned electric-operated cold storage and refrigerating plant. Cost over \$100,000 with equipment.

**Pedro Villado**, P. O. Box 915, Havana, Cuba, is at head of project to erect brick-manufacturing works and plans early purchase of machinery.

Two carloads of copper wire, 230 miles in all, are being used in the construction of a new totalizing machine being built at the Arlington Park race track in Chicago.

The machine is almost human. From 150 windows it issues tickets to those who want to bet. It totals the amount of money received, registering it so the betters may know at all times the odds on the different horses. It is the last-word in totalizing machines and is to cost \$250,000.



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# *Thirty Years of Experience*

WASHINGTON, June 25.—

This "date line" is familiar to all readers of The Iron Age. For the past 30 years, Iron Age has maintained, at the Nation's headquarters, a resident editor on full time service, familiar with the legislative news needs of our industry. Our present Washington editor has been "on the job" since 1921.

Knowledge of the needs of an industry, combined with familiarity with administrative and legislative news sources cannot be acquired over night. Nor are the resources and abilities of "news agencies" or professional "correspondents" adequate for the specific needs of industrial readers.

That is why The Iron Age has been able to give its readers, week after week, the most complete and useful Washington News Service of any industrial publication.

Now that the headquarters of American Business Control are moving to Washington, it is of vital importance that the rapid developments be intelligently selected, accurately reported and correctly interpreted. Readers of The Iron Age will now appreciate and benefit more than ever from the advantages of long experience and established contacts of our Washington editor.

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in these sheets, Jim”

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Yes, there is “good stuff in these sheets”...good, uniform iron accurately rolled to gage; and of just the right temper to work freely and keep down fabricating costs. Then we add the required special coating and check it carefully for weight, smoothness, adherence, and surface perfection. Whether you order INGOT IRON or Steel terne-coated sheets, you can look for definite improvement in the finished product.

One of the industries that has profited through the use of Armco terne-coated sheets is the casket industry. Here the majority of manufacturers use Armco INGOT IRON exclusively, so advantageous is its forming qualities and fine finish.

Could we help you gain dollar-savings and resale profits through the use of Armco Iron and Steel Sheets? A representative from our nearest office will be glad to study your requirements. Invite him in.

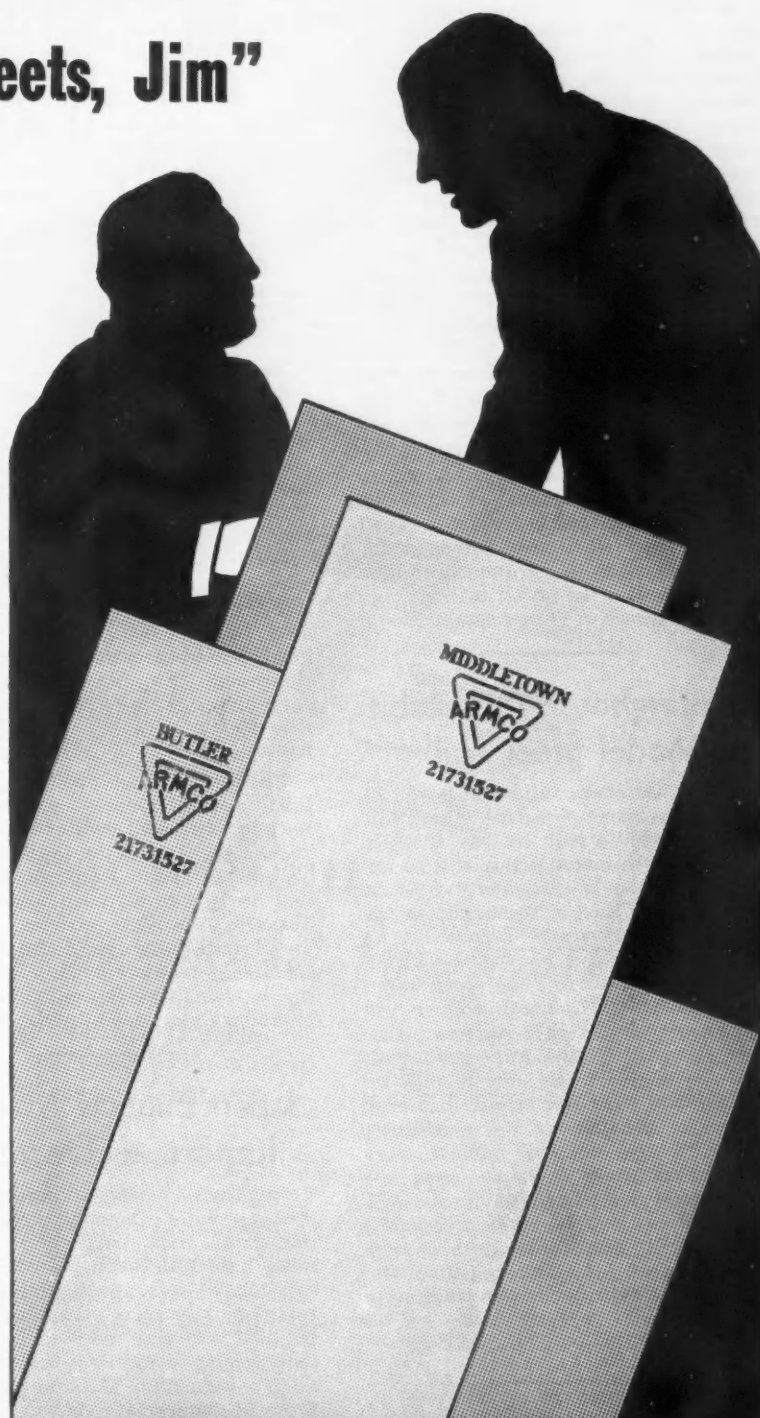
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## Residential Building Expands in April

Residential building contracts awarded during April showed an expansion of almost 20 per cent as contrasted with the record for the preceding month according to F. W. Dodge Corp. This gain is of large significance when contrasted with the fact that for total construction awards, inclusive of residential, a decline of almost 6 per cent occurred between the two months.

The April contract volume for construction of all types amounted to \$56,573,000; this contrasts with \$59,958,500 for March and \$121,704,800 for April of last year. For the first four months of 1933 contracts totaled \$252,599,800 as against \$407,783,500 for the corresponding period of 1932.

For public works the April total was \$11,232,500 as against \$15,079,400 for March and \$42,384,200 for April of last year. It is probable that for this latter class of construction some improvement may occur later in the year as a result of governmental work.

## Westinghouse to Exhibit Model Steel Mill

An actual operating scale model of one of the most powerful steel mills in the world, driven by the recently invented twin-motor drive, will be exhibited by the Westinghouse Electric & Mfg. Co., East Pittsburgh, at the Century of Progress Exposition in Chicago. It is a one-twenty-fourth scale model and will be at work under fully automatic control rolling out steel ingots into eighth sections. Colored wax will be used instead of steel, and the visitor needs only to pick up an ingot of "red hot steel," and drop it on the rolls to start the mill. It thereafter goes back and forth through twenty-one passes in the same manner as steel in process. Beside the mill will be shown several of the company's micarta roll-neck bearings, which have demonstrated long wearing qualities in actual service. The Westinghouse exhibit will be located in one end of the Great Hall of Electricity.

## Steel Casting Capacity Decreased in 1932

Supplementing the announcement of the American Iron and Steel Institute in the May 4 issue of THE IRON AGE, covering survey of capacities for pig iron, ferroalloys and steel ingots, the survey of steel castings capacity has now been completed and the figures are as follows:

	Basic O.H.	Acid O.H.	Bessemer	Electric	Crucible	Total
Dec. 31, 1932.....	776,400	662,190	27,025	525,580	1,060	1,992,255
Dec. 31, 1931.....	789,700	678,190	30,375	540,890	1,990	2,041,145

## Lists 3 Billions In Immediate Works Projects

WASHINGTON, May 19.—Accumulations of planned municipal, county and State public works construction which has been postponed during the past four years together with federal public works, can easily absorb the three billion, three hundred million dollar contemplated federal public works appropriation, says A. C. Tozzer, president of the Associated General Contractors of America and a member of the executive committee of the Construction League's National Committee for Trade Recovery.

Backing his statement with the incomplete but detailed compilation of over 3400 planned projects from all parts of the country which have been submitted to the Administration by the Trade Recovery Committee, Mr. Tozzer asserts that the list constitutes over a two billion dollar volume of sound and necessary public works which can and should be built in the immediate future. This latter figure does not include federal projects, grade crossing eliminations and slum clearance. He estimates that work could be initiated on a majority of them within the next three to nine months.

The list, itemized by states, includes bridges and tunnels, sewerage and sewage disposal, waterworks, flood protection, irrigation and drainage, highways, streets and paving, port and harbor development, schools and libraries, hospitals, prisons, asylums and institutional buildings and miscellaneous municipal projects, including parks, incinerators, airports and municipal gas and electric plants.

## Japan Expects Machine Imports to Decrease

Although foreign manufacturers, and especially American producers of industrial machinery and machine tools, have been selling a considerable quantity of such products to Japan in recent months, it is probable that such imports will soon decrease, according to a report to the Commerce Department's Industrial Machinery Division from Commercial Attaché H. A. Butts, Tokio.

Installations for which these products were imported will soon be completed. Continuing requirements will, in large part, be supplied by local manufacturers who are increasing production capacity.

A report published recently in Tokio stated that some 133 small factories and plants had been opened in Osaka and vicinity, and that these

plants were largely devoted to the production of iron and steel products and small machinery products. Most of the requirements for these very small operations are supplied by domestic manufacturers or from the second-hand market.

It is probable that the large installations in connection with the proposed merger of Japanese Government and private iron and steel works, when effected, will afford opportunities for American manufacturers.

The development of the Showa Steel Works in Manchuria, which is to take over the Anshan operations, will also probably call for the installation of American equipment, although it is reported that German manufacturers are submitting very low bids for such machinery and equipment.

## Canada's Electric Furnace Products

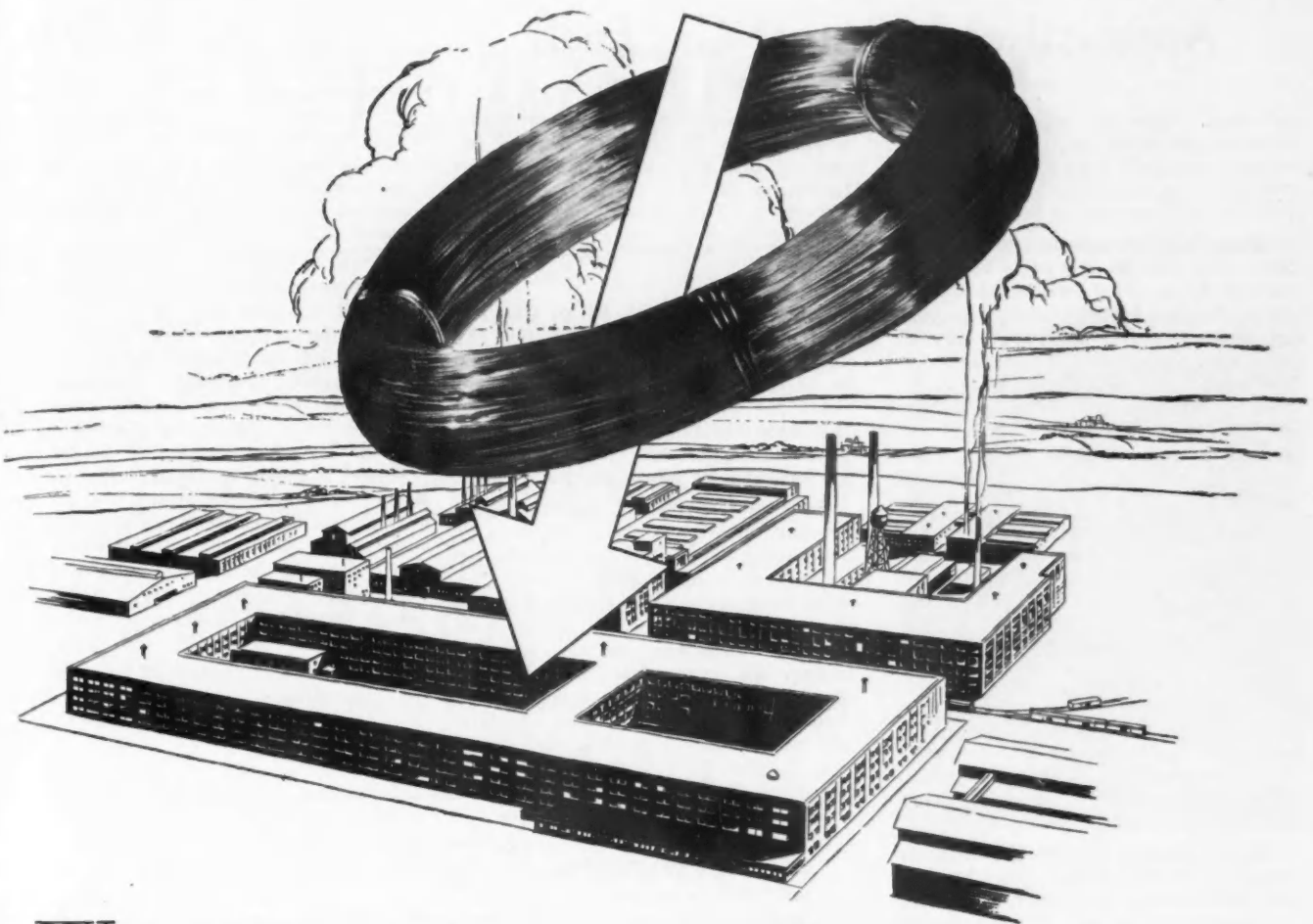
A summarization of the electric furnace industries of Canada was contributed to the Electrochemical Society at its meeting in Montreal by Prof. Alfred Stansfield, professor of metallurgy at McGill University, Montreal. His paper is a record of the developments to date, outlining the importance of abundant low-priced electric power and the strength of the Canadian position as a supplier to the world of aluminum, carbide, abrasives, ferroalloys and electrodes. He puts production in the light of the experience of the years 1925 to 1930 and the power requirements and value of product as follows:

	Tons per Annum	Horse-power Used	Value of Product
Aluminum ...	40,000	160,000	\$14,000,000
Carbide .....	250,000	130,000	10,000,000
Abrasives ...	60,000	50,000	6,000,000
Ferroalloys ..	50,000	30,000	3,000,000
Electric steel	50,000	30,000*	2,000,000
Annealing and brass-melting	.....	35,000*	.....
Electrodes and graphite ...	40,000	15,000	.....
		450,000	\$35,000,000

\*Use of this power is not continuous.

## I. C. C. Order Extends Missouri Barge Service

WASHINGTON, May 19.—The Interstate Commerce Commission has issued an order authorizing the government owned Inland Waterways Corp. to extend barge service to points on the Missouri River. The order also requires railroads to join with the barge line in publication of joint rates between Kansas City, Mo., and Kansas City, Kan., and Mobile, Ala., as well as intermediate Mississippi River points. The order also directed the railroads to make joint rates between Kansas City and Joliet, Ill., and intermediate Illinois River ports.



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## Appraisal of Industrial Gas Fuels

(Concluded from Page 818)

per cent. Then the selection of gas will depend upon cost per B.t.u., per "therm" (100,000 B.t.u.), or per 1,000,000 B.t.u., at which the two gases are offered, plus the cost of burning them.

Example: Natural gas, at 50c. per Mcf, (1,000,000 cu. ft.) costs 48.7c. per million B.t.u., net. But the heat "laid down" in the furnace, at 62 per cent efficiency, is 48.7c. for 620,000 B.t.u., or 78.5c. per mil. B.t.u., net. If anthracite gas is offered at a total cost of 40c. per mil. B.t.u., net, then at 1600 deg. F., 560,000 B.t.u. cost 40c., and 1,000,000 B.t.u., 71.5c. Then there is a 7c. difference in favor of anthracite gas.

**The Quantitative Air-Gas Ratio** for the gases in Table I varies greatly for each member. The values are gotten by computing the quantitative air requirements for combustion of each reacting gas constituent.

The real usefulness of this value is in combination with specific gravity. These values are used by combustion engineers in the design and specification of combustion equipment, particularly gas jets, entraining tubes, burner nozzle areas, etc.

**B.t.u. Per Cu. Ft. of Quantitative Air-Gas Mixture** is calculated by adding one volume (for gas) to the air volumes required, and dividing the result into the B.t.u. value (gross or net as desired). For the "high duty" gases of Table I, gross values vary between 93.7 and 104.5; and net values between 84.4 and 96.6. In passing, we may see that on a net basis, blue gas is superior to oven gas (86.4 to 84.4) whereas, on the gross basis, the reverse is true (93.7 to 94.3).

The producer gases vary from 71.4 to 67.6, gross; or 67.7 to 64.4 net. In the comparison between natural and anthracite gases, the potential heats are 1133.7 and 151.1 B.t.u., gross, respectively, per cu. ft., or in ratio of 7.5:1. At first sight, anthracite gas would seem to be completely outclassed. But in point of thermal value of air-gas mixture, 87.8 to 67.7, net, the ratio is only 1.3:1, at the burner nozzle.

**The Cu. Ft. of Combustion Products Per Cu. Ft. of Gas Burned** presents a set of values giving another indication of the comparative value of gases. These values are also computed with the use of quantitative chemical data. By dividing them into the B.t.u. values, net or gross, per cu. ft. of the respective gases, we determine the precise relative concentration of heat liberated at the point of application, in which we are most interested.

**The B.t.u. Per Cu. Ft. of Combustion Products** shown in Table I, on the assumption that standard conditions ultimately prevail, show the relative positions of these gases far better than any statement of gross or

net B.t.u. per cu. ft. of unburned gas. From Table I, the net values for natural and anthracite gases are in the ratio of 85.7 to 74.9, or about 1.15 to 1. This should serve to correct the habit of making snap judgments based solely upon the heat values per cu. ft.

**The Number of Cu. Ft. of Gas Per Million B.t.u.** is a useful figure in the design of distribution systems. It can be as misleading as the statement of B.t.u. per cu. ft., however, because of the wide variations. The variations have no importance in judging the performance of a gas in the furnace.

**Specific Gravity** of gases has no bearing on heating value, as seen by comparing the values for butane and its high duty neighbors; or oven gas, with water gas. The weight of gases has a direct bearing on the cost of burning, especially on the item of power. In single pipe systems, when gas is supplied at a pressure sufficient to allow use of venturi tubes and nozzle or "spud" injectors, for auto-

matically forming homogeneous, predetermined air-gas mixtures, the pressure to be carried on the gas system depends upon the volume of air required by the gas for combustion, and the ability of the jets of gas to entrain the air. Heavy gases will entrain the greatest amounts of air per unit volume, for equal pressure.

It is interesting to note the gas pressures dictated by the condition of specific gravity, and of air required. One pound per sq. in. is satisfactory for any of the producer gases, to give a constant, accurately proportioned mixture over a practical operating range. For the same method with natural gas, a pressure of 20 lb. per sq. in. may be required. Water gas and oven gas will give the proper range at about 10 lb. The range of operating with constant proportions was usually in a ratio of 1:4, until recently, when two-stage injectors have increased the range to about 1:10.

A brief continuation of this article relates to the products of combustion of the different gases.

## Modern Bicycle Production

(Concluded from Page 815)

ing upon the finish desired. After each coat the frames are dried and baked. The first position of drying is over a second drip tank in order to reclaim some of the excess enamel. After a few minutes over this tank the frames are moved to the racks of the drying oven. The operator alternates his work from one dipping tank to another, as the drip racks become full, and adds fresh enamel as needed. Between each coating of enamel, the frames and other enamelled parts are baked for 1½ to 2 hr. at 225 to 350 deg. F. After this they are hand-rubbed and hand-decorated and then varnished and again baked at 180 deg. F.

Mud guards are rolled to form from flat strip steel in an ingenious process which not only gives the required curve of cross-section but also produces the radius of the entire guard. All small parts are heat treated in modern pyrometer-controlled furnaces. The bicycle sprockets are polished by hand on leather-surfaced wheels coated with a mixture of emery and oil. When the parts have all been completed they go to a large assembly room where progressive assembling gradually produces the complete bicycle.

Most all of the operators take care of their own tools on their own time but there are certain exceptions to this. Milling cutters and other similar cutting tools are furnished the operators by the management as may be required and to avoid difficulty there

are two tool repair and cutting departments, one to be used by the regular operators engaged in production work repairing their own tools and the other to be used in the grinding and preparation of cutters and special tools as mentioned. The operators in this second tool room work on piece rate, getting a stipulated sum for regrounding cutters and other upset figures for other types of tools.

### Piecework Develops Better Methods

The piecework basis of pay is the rule on all work and has been the rule for many years. The operators are encouraged by rewards to find short cuts and new and better methods of doing things and many economies have been developed through the years. One of these is in connection with three hydraulically operated freight elevators. The water used to operate these freight elevators is afterward used as feed water for the boilers of the power plant. Some idea of the production attained may be gathered from the fact that the crank and axle part is machined on piecework at the rate of \$3.50 a hundred.

**Metal Clad Doors, Inc.**, 675 Concord Avenue, Cambridge, Mass., has purchased the machinery and equipment of the Penn Pressed Steel Division of the Housing Co., 675 Concord Avenue, Cambridge, and will manufacture pressed steel products as well as metal-covered doors at this plant.